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Air Target Pistol.

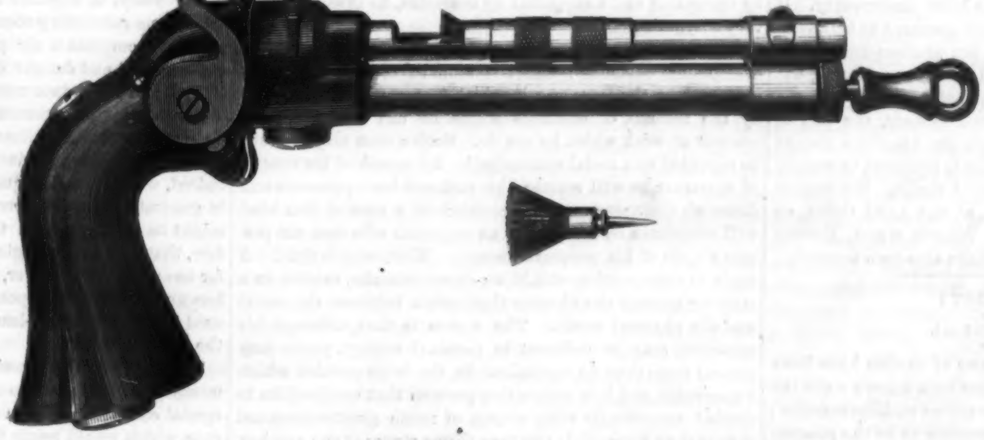
There is a peculiar fascination in all amusements that require skill of hand, eye, and judgment, which entirely distinguishes them from games of chance. The latter soon pall upon the taste without the zest given to them by stakes. The former, the more they are indulged in, the more they delight, because with increasing skill there is an increasing sense of acquired power, which always comes from discipline.

There is all the difference between these two classes of amusements that exists between health and disease, between moral purity and moral depravity. Hence those who have made moral science a study have been unanimous in recommending games of skill, and just as unanimous in deprecating games of chance.

Among all the recreations which demand skill, perhaps none present more attractions to the majority of mankind than shooting; and this amusement is also an educating exercise, training the eye and nerves to steadiness and precision.

At pleasure resorts and watering-places, air-gun practice has become a standard amusement with both sexes.

Air pistols and guns have heretofore been somewhat expensive, costing from twenty dollars to sixty dollars, according to style and finish. The pistol herewith illustrated costs only three and a half dollars, and is, we believe, the cheapest air pistol ever constructed.



HAWLEY'S AIR TARGET PISTOL.

The stock or handle is of japanned iron, the barrels being of brass. The lower barrel is the air-pump, by which the stock is filled with condensed air.

The dart or bullet is put into the breech end of the upper barrel, through an aperture shown in the engraving, and the aperture is then closed by a ring slide.

The hammer of the lock strikes upon a solid nipple which communicates with and opens a valve leading from the air chamber to the upper barrel, and allows just sufficient air to escape for a charge. It will shoot from five to ten shots a distance ranging from thirty to fifty feet at one charging.

Darts are furnished with each pistol, and every piece is tested before leaving the factory. E. H. Hawley, patentee, June 1, 1869. For rights and pistols address P. C. Godfrey, agent, 119 Nassau street, New York.

Improved Peat Machine.

Our readers have seen enough upon the subject of peat in these columns to need little posting in regard to the importance of a machine which can successfully deal with this somewhat difficult material to manipulate.

The fact that there exists in this country an immense aggregate area of peat lands, and that it is calculated that some of these lands will produce one thousand tuns of condensed fuel per acre, is enough to arouse attention to the immense value of these deposits. It may even be questioned whether these deposits do not exceed in value those of coal and petroleum.

Our readers have been well informed also in regard to the industrial value of this fuel in the generation of steam, particularly on locomotives and steam vessels also in metallurgy and for domestic purposes.

This value has been so well understood and appreciated that very numerous attempts have been made to devise a machine to prepare it for market. The advances have been slow but sure, and earnest efforts are still making both in this country and in Europe to surmount difficulties which at first seemed almost insurmountable. These difficulties are finally yielding to inventive skill, and resolute effort.

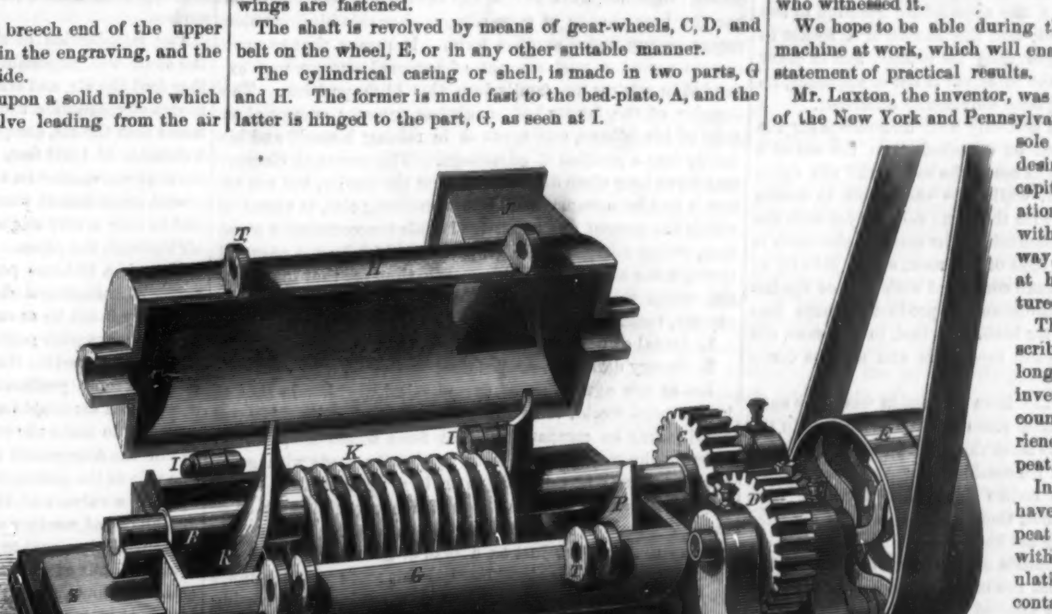
It is claimed that the machine herewith illustrated has combined all the elements necessary to the successful working of peat, and that it gives a firm compressed fuel suitable for metallurgic operations, and of course for other industrial purposes.

The machine bears a strong resemblance to the rotary sausage meat cutting machines quite commonly known throughout this country.

The engraving is a perspective view with the cover turned back. A is the platform or bed-plate upon which the machine is supported. B is the shaft upon which the knives and wings are fastened.

The shaft is revolved by means of gear-wheels, C, D, and belt on the wheel, E, or in any other suitable manner.

The cylindrical casing or shell, is made in two parts, G and H. The former is made fast to the bed-plate, A, and the latter is hinged to the part, G, as seen at I.



LUXTON'S IMPROVED MONITOR PEAT MACHINE.

J is the hopper, attached to or forming part of the cover, H, through which the peat is introduced.

K represents a series of cutters or knives, fastened on the shaft in any suitable manner, so that they cannot turn independently of the shaft.

These cutters are separated by the collars, L, and kept at a proper and uniform distance apart, so that they engage with vertical slots in the bed-piece.

These slots in the bed leave vertical studs or teeth, of rectangular form in their cross section, but tapering edgewise.

The cutters may be revolved in an opposite direction for cleaning or washing the machine, or other purposes, whenever it is desired.

Directly beneath the hopper or orifice, J, and firmly attached to the shaft, is a spiral wing, P, so placed as to convey or force the peat toward the cutters.

After the peat has passed through the cutters, there is another spiral wing, R, which receives the comminuted peat from the cutters and forces it from the machine, through the orifice, S, in a broad sheet, or any other form wished.

By this machine the peat is operated upon as it is taken from the peat-bed and delivered in a finely comminuted state in a form suitable for drying. The sheet is cut up, before drying, into suitable sized pieces for convenient handling after being dried.

The top part of the machine is fastened down to the other part by means of pins or screws through the lugs, T, or in any other suitable manner.

We have not yet had an opportunity of seeing this machine in actual operation, but we are confident it is correct in principle, and entertain no doubt as to its efficiency in practice. This opinion is strengthened by the reports of those who have seen it in operation and upon whose testimony we can rely. We are further informed that, on the 8th September last, a public trial of the Luxton Peat Machine was made at the Engine Works of Messrs. Porter & Allen, in Harlem, New York, in the presence of a number of scientific gentlemen and others engaged in the peat business, and that its perfect success was acknowledged with enthusiasm by all who witnessed it.

We hope to be able during the coming season to see the machine at work, which will enable us to give our readers a statement of practical results.

Mr. Luxton, the inventor, was formerly the superintendent of the New York and Pennsylvania Peat Works. He is now sole owner of those works, and desires to secure a partner with capital to put them in full operation. The works are situated within one mile of the Erie Railway, and therefore a market is at hand for the fuel manufactured.

The machine we have described has been the result of long study on the part of the inventor, than whom few in this country have had a larger experience in the manufacture of peat.

In other machines attempts have been made to compress the peat just as cut from the bog, without any preliminary manipulation. The vegetable fiber, contained more or less in all peat, has rendered it impossible to thus compress the fuel so that it would not become injured by wet. We have specimens of compressed fuel now on our table prepared from coarse surface bog by this machine, as dense to all appearance as Peach Orchard coal; and its specific gravity is about equal to, and it will absorb no more water than, that excellent coal.

The inventor affirms that at 100 revolutions per minute the machine will grind and compact 30 tuns per hour; but at the usual speed, requiring seven horse power, it easily produces 150 tuns per day of ten hours, at a cost for attendance of about eighty dollars.

Many railroads are now using peat, which is found peculiarly adapted to their purpose, as no alteration is necessary in their furnaces, and steam can be got up in a cold boiler much quicker than by the use of wood.

On an English railroad, a special locomotive trial gave the following results: "With peat, a pressure of 25 lbs. of steam

was obtained *in one hour and thirty-two minutes*, while, with coal, it took 2 hours 25 minutes to secure a pressure of 10 lbs. In keeping up steam at 30 lbs. pressure, for 8 hours, the consumption of peat was 1,150 lbs., and of coal 1,750 lbs. On another road, the use of peat for three months was found to be 30 per cent cheaper than that of coal."

In a trial made on the Grand Trunk Railway, reported in a former issue of this journal, it was found that in ascending grades the pressure of the steam gage invariably increased. The damper was nearly closed at all times, the slot in the door open nine by two inches, and with never more than from six to nine inches of fuel in the fire box. Abundance of steam was raised; and, for a distance of many miles, the pressure of steam did not vary.

On the return trip, with a similar weight of fuel, and a train of six passenger cars:

The total distance run was	172 miles.
Fuel used per mile	71 lbs.
Average speed, including stoppages	22 miles.
Greatest pressure of steam	125 lbs.
Least pressure of steam	85 lbs.

Experiment with engine No. 65, in good working order, and with peat fuel containing about twenty per cent of water.

Express train, consisting of six passenger cars.

Total distance run	177 miles.
Total consumption of fuel	7,836 lbs.
Consumption per mile	45 "
Maximum consumption between stations	60 "
Minimum consumption between stations	30 "
Average speed, including stoppages	25½ miles.

There is no lack of testimony as to the value of peat for locomotive use and in the reduction of ores, and we might fill columns upon this point, but it is quite unnecessary. If Mr. Luxton has succeeded—as we are prepared to believe—in at last producing a machine that can produce compressed peat at a sufficiently cheap rate, and of proper density, the success of his invention is beyond a peradventure.

The machine is covered by several patents, the last of which was issued, through the Scientific American Patent Agency, April 5, 1870. The patentee is prepared to supply machines, or to negotiate for the sale of rights. For further information address Charles Luxton, at the Land Office, on the corner of Palisade avenue and Warren street, Hudson City, New Jersey. Foreign Patents have also been secured.

WHAT IS ENERGY?

[Balfour Stewart in Nature].

It is only of late years that the laws of motion have been fully comprehended. No doubt it has been known since the time of Newton that there can be no action without reaction; or, in other words, if we define momentum to be the product of the mass of a moving body into its velocity of motion, then whenever this is generated in one direction an equal amount is simultaneously generated in the opposite direction; and whenever it is destroyed in one direction an equal amount is simultaneously destroyed in the opposite direction. Thus the recoil of a gun is the appropriate reaction to the forward motion of the bullet, and the ascent of a rocket to the downrush of heated gas from its orifice; and in other cases where the action of the principle is not so apparent, its truth has notwithstanding been universally admitted.

It has, for instance, been perfectly well understood for the last 200 years that if a rock be detached from the top of a precipice 144 feet high it will reach the earth with the velocity of 96 feet in a second, while the earth will in return move up to meet it, if not with the same velocity yet with the same momentum. But inasmuch as the mass of the earth is very great compared with that of the rock, so the velocity of the former must be very small compared with that of the latter, in order that the momentum or product of mass into velocity may be the same for both. In fact, in this case, the velocity of the earth is quite insensible and may be disregarded.

The old conception of the laws of motion was thus sufficient to represent what takes place when the rock is in the act of traversing the air to meet the earth; but, on the other hand, the true physical concomitants of the crash which takes place when the two bodies have come together were entirely ignored. They met, their momentum was canceled—that was enough for the old hypothesis.

So, when a hammer descends upon an anvil, it was considered enough to believe that the blow was stopped by the anvil; or when a break was applied to a carriage-wheel it was enough to imagine that the momentum of the carriage was stopped by friction. We shall presently allude to the names of those distinguished men who have come prominently forward as the champions of a juster conception of things, but in the meantime let us consider some of those influences which served to prepare men's minds for the reception of a truer hypothesis.

We live in a world of work, of work from which we cannot possibly escape; and those of us who do not require to work in order to eat, must yet in some sense perform work in order to live. Gradually, and by very slow steps, the true nature of work came to be understood. It was seen, for instance, that it involved a much less expenditure of energy for a man to carry a pound weight along a level road than to carry it an equal distance up to the top of a mountain.

It is not improbable that considerations of this kind may have led the way to a numerical estimate of work.

Thus, if we raise a pound weight one foot high against the force of gravity we may call it one unit of work, in which case two pounds raised one foot high or one pound raised two feet high would represent two units, and so on. We have therefore only to multiply the number of pounds by the vertical hight in feet to which they are raised, and the product will represent the work done against gravity. The force of gravity being very nearly constant at the earth's surface, and always in action, is a very convenient force for this purpose; but any other force, such as that of a spring, would do equally well to measure work by. Generalizing, we may say, *the space moved over against a force multiplied into the intensity of that force will represent the quantity of work done.* So much for the definition of work, and it is necessary to know what *work* is before proceeding to define *Energy*.

Now what does the word Energy really mean? In the first place it does not mean force.

Two substances may have an intense mutual attraction, in virtue of which they form a very intimate union with one another; but when once this union has been consummated, although the force still continues to exist, the combination is singularly deficient in Energy. Nor does Energy mean motion, for although we cannot have motion without Energy, yet we may have Energy without motion.

By the word Energy is meant the power of doing work; and the energy which a laboring man possesses means, in the strictly physical sense, the number of units of work which he is capable of accomplishing.

This is a subject which at this stage we may attempt to illustrate by reference to a very different department of knowledge.

The analogy which we shall venture to institute is between the social and the physical world, in the hope that those who are more familiar with the former than with the latter may be led to perceive clearly what is meant by the word Energy in a strictly physical sense. Energy in the social world is well understood. When a man pursues his course, undaunted by opposition and unappalled by obstacles, he is said to be a very energetic man.

By his energy is meant the power which he possesses of overcoming obstacles; and the amount of this energy is measured (in the loose way in which we measure such things) by the amount of obstacles which he can overcome—the amount of work which he can do. Such a man may in truth be regarded as a social cannon-ball. By means of his energy of character he will scatter the ranks of his opponents and demolish their ramparts. Nevertheless, a man of this kind will sometimes be defeated by an opponent who does not possess a tithe of his personal energy. Now, why is this? A reply to this question will, if we do not mistake, exhibit in a striking manner the likeness that exists between the social and the physical world. The reason is that, although his opponent may be deficient in personal energy, yet he may possess more than an equivalent in the high position which he occupies, and it is simply this position that enables him to combat successfully with a man of much greater personal energy than himself. If two men throw stones at one another, one of whom stands at the top of a house and the other at the bottom, the man at the top of the house has evidently the advantage.

So, in like manner, if two men of equal personal energy contend together, the one who has the highest social position has the best chance of succeeding. For this high position means energy under another form. It means that at some remote period a vast amount of personal energy was expended in raising the family into this high position. The founder of the family had, doubtless, greater energy than most of his fellows, and spent it in raising himself and his family into a position of advantage. The personal element may have long since disappeared from the family, but not before it had been transmuted into something else, in virtue of which the present representative is able to accomplish a great deal, owing solely to the high position which he has acquired through the efforts of another. We thus see that in the social world we have what may justly be termed two kinds of energy, namely:

1. Actual or personal energy.
2. Energy derived from position.

Let us now again turn to the physical world. In this, as in the social world, it is difficult to ascend. The force of gravity may be compared to that force which keeps a man down in the world. If a stone be shot upwards with great velocity, it may be said to have in it a great deal of actual energy, because it has the power of doing useful work or of overcoming up to a great hight the obstacle interposed by gravity to its ascent, just as a man of great energy has the power of overcoming obstacles. But this stone as it continues to mount upwards will do so with a gradually decreasing velocity, until at the summit of its flight all the actual energy with which it started will have been spent in raising it against the force of gravity to this elevated position. It is now moving with no velocity—just, in fact, beginning to turn—and we may suppose it to be caught and lodged upon the top of a house. Here, then, it remains at rest, without the slightest tendency to motion of any kind, and we are led to ask what has become of the energy with which it began its flight? Has this energy disappeared from the universe without leaving behind it any equivalent? Is it lost forever, and utterly wasted? But the answer to this question must be reserved for another article.

Air Power in Manufactures.

A recent experiment in the mines of Galena, in the use and transmission of compressed air as a motive power, is, says the *Bureau*, full of suggestion and interest to all who find the increased rates of insurance, and the dangers of destruction by fire, owing to the introduction of steam engines into their premises, a serious deduction from their profits and an embarrassment to success. A small steam engine of 10-horse power will often add one per cent to the rates of insurance on hundreds of thousands of dollars of property in the same building. Where, as in planing mills, saw mills, and manufactories of light wooden wares, the dangers from the introduction of steam are enhanced by the collection of large quantities of light combustible substances, near its fires, flues, and sparks, the chances of fire are so increased that the soundest insurance companies refuse the risks altogether. If, therefore, the expansive power of compressed air can be substituted for that of steam, with economy in the cost of producing the power, some important advantages will be gained. As the power is not, like that of steam, dependent on the existence or retention of heat, it can be transmitted through pipes of any required length, almost as gas is sent from a central reservoir to all parts of a city. At all events, while steam would cool and lose its power in any attempt to transmit it through pipes a few score feet, compressed air could be transmitted for thousands of feet, for several city blocks, at least, without any loss of power, in proportion to the degree of compression. Hence, if the machinery for compressing the air, which it is assumed must be driven by steam power, be erected in one block so protected as to be absolutely fire-proof, the pipes will carry the power to the machinery in any number of surrounding blocks, which being thereby freed from the introduction of heat into their premises, may run any weight of machinery, and be surrounded by any quantity of combustible matters without increasing their liability to fire, so far as their power is concerned. Where block after block is filled with saw and planing mills, wagon and blind factories, and even founderies, machine shops, and grist mills, the reduction of insurance, if it could be effected without loss of power, would amount to a saving of hundreds of thousands annually.

The one question which determines the practicability of this economy, is, whether the loss of motive power, which arises from converting steam power as it comes from the engine into compressed air power, is equal to the present cost of insurance, and danger of destruction by the introduction of fires and steam into manufacturing premises. Some loss, of course, may be expected to arise, for on the common principle of mechanical philosophy, a cause must equal its effect, and no force can give rise to a force which exceeds itself, or indeed, which is not less than itself by the friction involved in generating the new force by the power of the old one. It might be assumed from this principle of mechanics, therefore, that if a steam engine be employed in condensing air for use as a motive power, the compressed air will furnish a less number of "horse-power" than that of the steam engine used in condensing it—less by the amount of the friction and the waste.

The value of the experiment at Galena consists in its demonstration that the loss of power is so slight as to be of no special consequence compared with the important pecuniary gain which would result from the substitution of air power for steam power. In that experiment it was found necessary to transmit compressed air from the surface, where it was obtained by air pumps, worked by a steam engine of 10-horse power, through pipes down a shaft of 1,300 feet in depth, in order there to work a pump for expelling the foul air to the surface.

The introduction of a steam engine into the bottom of the shaft was impossible because of its tendency to still further foul the air, and other objections existing to the simpler modes of ventilation usually used in the coal mines. It was found that the air, compressed by a 10-horse power engine at a distance of 1,300 feet, formed a motive power equal to a 9-horse power engine on the spot; that the loss of one tenth in power, arose almost wholly from the friction of the air pumps, and in only a very slight degree from the transmission of the air through the pipes.

Now, if a 10-horse power steam engine can send 9-horse power of compressed air into a building 1,300 feet distant, why may it not be as easy and profitable to supply manufacturing blocks with power, as to supply a whole city with gas? It is not impossible that two sets of pneumatic tubes might be found more profitable than one. Through one of these compressed air could be sent, from a sufficiently large central reservoir to make the supply uniform and the pressure steady. While the compressed air is introduced into the cylinder on one side of the piston, the cylinder on the other side might open by a valve, and through a similar pneumatic tube into an exhausted receiver or huge vacuum, having an exhaustive power exactly equal to the compressive power of the air reservoir. Thus every air engine might be worked on the principle of a low-pressure steam engine—that is, with a simultaneous pressure on one side of the piston and exhaustion on the other. Whether this joint use of compressed air and a vacuum would be a more economical use of power, than to rely solely on the compressed air, could probably only be determined by an experiment.

While the change, if it should accomplish the economy that might seem naturally to be expected from it, would be of vast importance to the manufacturing world, it is obvious that there is nothing patentable or susceptible of monopoly in any part of it. The steam engine, the air pump, the pneumatic tube, and engines propelled by air, whether heated or cold, are all old, and we do not suppose any combination of them in a manner designed merely to save extra building expenses and insurance, can be considered an invention. It amounts, however, to a suggestion worthy the attention of all manufacturers and users of machine power.

THE coach is a French invention. The first coach seen in England was in (about) 1563. In 1626 the vehicle was first plied for hire.

A SINGLE establishment in this city—the Singer Sewing Machine Company—turns out five hundred sewing machines per diem. The works are run night and day.

MEAT PRESERVING IN MELBOURNE, AUSTRALIA.

Having in regard the enormous and continually advancing progress which meat preserving and its consumption have taken of late years, we are induced to present to our readers a description of the works of the Melbourne Meat Preserving Company, condensed from the London *Grocer*.

The Melbourne Meat Preserving Company was established on December 31, 1867, at a meeting of squatters, and others interested in finding a market for their surplus stock, and the projected process of preservation was that devised by Mr. S. S. Ritchie, who earned his experience in meat-preserving establishments in Great Britain. He was supported in the first instance by the firm of Holmes, White & Co., who encouraged his experiments with Australian meat, and backed his enterprise. The result has been successful. At the present moment the Company's capital consists of £40,000,in 8000 shares of £5 each, all called up, and the premises consist of an extensive series of buildings, erected on a site adjoining the Saltwater River,within three miles of Melbourne. It employs 251 persons, including a large number of boys; pays weekly wages amounting to £493, purchases from 7000 to 8000 sheep, and from 80 to 100 head of cattle, worth together from £3500 to £4000 (the present average price is 8s. per sheep, and £7 per bullock) per week; and produces weekly £6000 worth of produce—item, 17,000 tins of preserved meat, worth £2450, 65 tuns of tallow, worth £2350, and sheepskins, hides, bones, and sundries worth £1200. Its operations in January, 1870, alone, comprised the shipping to London of 48,620 tins of meat (weight of meat 295,012 lbs.), and 780 casks of tallow, weighing 254 tuns, 1 cwt., 2 qrs. But this is not all, for the excellence of the meat, so preserved, has caused an enormous local consumption, and the local demand is daily increasing. In the article of ox and sheep's tongues, for instance, export is not to be thought of, for though the Co. purchase about half the amount of sheep and cattle consumed in Melbourne itself, yet it is unable to supply these tongues (in a preserved form of course) fast enough for its local customers. Its sale for consumption in the colony amounts to 61,455 tins, or 183,806 lbs. of meat.

The above are preserved in vacuo,and guaranteed to remain perfectly sweet any length of time and in any climate.

The Company's buildings being on the side of a hill, are arranged conveniently in stages, and as they spread over a considerable area, tramways, ingeniously designed for easy transit, connect the departments. First come the slaughter houses and sheep and cattle pens. The former are substantially built of stone, with ample means of ventilation. Drainage is obtained by a false floor, composed of joistings laid as a grating, and thus all fluid matter runs through into a bluestone reservoir beneath, which, in its turn, drains into the places prepared for that purpose. The strictest exercise to obtain cleanliness appears to be the pervading rule of the establishment, and necessarily so, for much of the Company's success depends upon the meat being put up in the best form, which could not be the case if it had to remain in an atmosphere charged with noxious gases. The Company is now working day and night, and 1000 head are brought in for the day's work, and 500 head for the night's operations. Water is laid on in every direction. The process of slaughtering is of the simplest, and the sheep are brought into the slaughter-house, polled, disemboweled, and skinned with such amazing speed that it is only the allotted work of two men and a boy. The bullocks are killed by spearing,and the use of very simple tackle enable the easy transit of the carcasses,which are eventually hung on a truck (used for sheep also) constructed for the purpose, and run along a tramway to the scene of the next series of operations. It is not too much to say that the only observable smell in these slaughter houses is that of fresh meat, for the blood and offal have no time to accumulate.

The carcass, as it leaves the slaughter yards, is next taken to the "butcher's shop," where the meat is boned and jointed, ready for the kitchen, and it is fully occupied by the men and boys at work preparing mutton and beef for the tins, and sorting it into the lots required. The greatest cleanliness prevails here. In dealing with mutton, the legs and shoulders are boned, and, sometimes, when the sheep is a particularly fine one, a portion of the sides is put up, too, as mutton with bone; but, in most cases, the fore-quarter, except the actual shoulder, is abandoned altogether to the boiling-down part of the establishment, where the tallow is extracted, and the remainder turned into manure. Indeed, it is a fixed rule to to consign to the tallow vats all the inferior portions of every animal preserved. All the bone is taken from the beef, the rounds, flanks, and briskets of which are turned into "corned beef," and the rest is made into "roast or boiled beef" (fresh). As fast as the meat is sorted into the requisite quantities, it is placed in trucks, which run on a tramway to the "kitchen." The first process there is to place the meat on large trays, and immerse it for a few minutes in boiling water, which scalds it, and removes scum and possible impurities. Steam lifts next carry the trays away to tables, on to which their contents are shot. Nimble fingers then place the meat in the tin canisters, which are brought in from the tinmen's room; and it is now that care is taken to give adequate weight, and to insure further the great desideratum of cleanliness. As fast as the canisters are filled, tinmen solder on the tops, and each canister is then intact, save a small pinhole in the center of the convex-shaped cup. The canisters are next put into huge trays, which steam hoists carry aloft into the preserving room. In the "roasting and soup" department of the kitchen are six 260-gallon coppers,of the kind known as "jacketed pans"—*i.e.*, with a chamber left between the outside and inside coating of the copper to be filled with the steam by which the boiling process is effected. In these coppers is boiled the stock for the soups, which, when ready for use, is drawn off by taps, cooled, and passed into the kitchen, where it is placed in the pans with the material that establishes its flavor, and which is prepared in the same apartment. In this place, too, is a special process for the manufacture of "extractum carnis," or the essence of meat prepared according to Liebig's process. An essential feature of the latter is the reduction of the extract in shallow pans at a low temperature.

It will be recollected that the soldered canisters, the pinhole open at the top, have been conveyed to the "preserving room." The trays—in each of which 100 tins have been placed—have perforated bottoms—and they are carried along the room on travelers, and lowered into the cisterns ranged round the room,and sufficiently full of a chemical composition of which muriate of lime forms a large ingredient. The cisterns are heated by steam, and here the canisters are boiled, according to the nature of their contents and the amount of cooking they are intended to undergo. As we have before indicated, Mr. Ritchie's process involves the expulsion of air to the last particle possible, and to secure this, whatever the amount of cookingrequired,the concluding point is alwayswhen a jet of steam is being expelled through the pin-hole. At this juncture the solderers come and solder up the pin-hole, applying a cold sponge immediately afterward to cool the solder and prevent the steam from forcing its way through. This final process is a very delicate one,and great skill is demanded from the workmen who perform it, for an extra pressure of the finger might cause air to re-enter the tin, the effect of which would be found out in the testing room, and cause the ruin of the meat. So soon as the tin is hermetically sealed in this way, the canister is subjected to a still higher heat, by which means the trifling quantity of air that may be left inside is nullified. The tins are then hoisted away into the cooling room, from which each day's work passes in batches to the testing room. The appliances for cooling are so ar-arranged, that when once the contents of the canisters have received their last heating, the temperature is rapidly reduced by cold water, and in this way the cooking is not allowed to continue a moment beyond the needful point. The temperature of the testing room is kept at 100° Fah., and here the canisters remain a certain time—generally seven days—to develop defects which are ordinarily exhibited by the exudation of the contents or the convexity of the ends of the tins. On leaving the testing room,the tins are carried off into other apartments, where they are painted, labeled, and packed in wooden cases, stenciled with marks showing their contents. Last of all, they are placed in trucks and transported by rail to the Company's wharf on the river side, when they are put into lighters for transit to the exporting ship's side.

Besides all this, there is a melting department for tallow, which the Company export so largely, being impelled thereto by the necessity of utilizing their *débris*. The latter is packed into trucks and carried on rails to a staging in the melting room, from which it is unloaded into six huge vats. There are three large and three small vats, and they hold,collectively, as much as would constitute the carcasses of 1200 sheep. The fat, being boiled out, is carried off by spouting for refining, and from the refinery it runs into coolers, from whence it is turned off by means of taps into the barrels in which it is sent to market. All the above processes are arranged so that there shall be no handling of the fat, and the human labor required is comparatively trifling. Outside this department is a kind of mill, where the bones and other *débris*, after boiling, have their last drop of fat expressed from them.

The Company's works include other processes and manufactures, the most interesting of which is, perhaps, to be seen in the tinmen's room, which is fitted with a large variety of cutting, rolling, and die sinking machines. Here are forty-four tinsmiths preparing the tins. The engineer's room is provided with lathes, forges, and all the appliances for keeping the tools, etc., of the establishment in order. There is, also, a cooperage, where the tallow casks are made to exactly suit the purpose in view.

Curiosities of Breathing.

The taller men are, other things being equal, the more lungs they have, and the greater number of cubic inches of air they can take in or deliver, at a single breath. It is generally thought that a man's lungs are sound and well developed, in proportion to his girth around the chest; yet observation shows that slim men as a rule will run faster, and farther, with less fatigue, having "more wind," than stout men. If two persons are taken, in all respects alike, except that one measures twelve inches more around the chest than the other, the one having the excess will not deliver more air at one full breath, by mathematical measurement, than the other.

The more air a man receives into his lungs in ordinary breathing, the more healthy he is likely to be; because an important object in breathing is to remove impurities from the blood. Each breath is drawn pure into the lungs; on its outgoing, the next instant, it is so impure, so perfectly destitute of nourishment, that if rebreathed without any admixture of a purer atmosphere, the man would die. Hence, one of the conditions necessary to secure a high state of health is, that the rooms in which we sleep should be constantly receiving new supplies of fresh air through open doors, windows, or fireplaces.

If a person's lungs are not well developed, the health will be imperfect, but the development may be increased several inches in a few months, by daily out-door runnings with the mouth closed, beginning with twenty yards and back, at a time, increasing ten yards every week, until a hundred are gone over, thrice a day. A substitute for ladies and persons in cities, is running up stairs with the mouth closed, which compels very deep inspirations, in a natural way, at the end of the journey.

As consumptive people are declining, each week is witness to their inability to deliver as much air at a single out-breathing as the week before; hence the best way to keep the fell disease at bay is to maintain lung development.

It is known that in large towns, ten thousand feet above the level of the sea, the deaths by consumption are ten times less than in places nearly on a level with the sea. Twenty-five persons die of consumption in the city of New York, where only two die of that disease in the city of Mexico. All know that consumption does not greatly prevail on hilly countries and in high situations. One reason of this is, because there is more ascending exercise, increasing deep breathing; besides, the air being more rarefied, larger quantities are instinctively taken into the lungs to answer the requirements of the system, thus at every breath keeping up a high development. Hence the hill should be sought by consumptives, and not low flat situations.—*Hall's Health Tracts.*

The Birmingham Die-Sinkers.

Die-sinking is a most important branch of Birmingham industry, and has had an existence since the year 1650. It is now almost wholly in the hands of "garret-masters," who work for the larger manufacturers, its wide distribution having chiefly been brought about during the last half-century. It has been well remarked, that as the die-sinker executes almost all, and in some cases quite all, his work for various manufacturing houses, he seldom gets the credit of his performances with the public. Some well-known manufacturer in Birmingham, London, or elsewhere, brings the finished goods into the market, often stamped with his own name, and and absorbs the praise justly due to the garret-master, up an entry, in a back street, who is the real author of the work.

The principal departments of die-sinking, in Birmingham, as indicated by the industries in which dies are most largely used,are,says the *Engineer*, coining, medaling, button-making, steel seals, and ornamental metals.

The demand for dies used in coining has been subject to considerable fluctuations, owing, in many cases, to Government interference. In 1812, dies were made for coining gold forty-shilling pieces, of which 800 were struck, the only gold coins ever struck in Birmingham. They were for a banker in Reading, named Monk. Two millions of penny tokens for circulation among the British forces in Spain were struck, in the same year, from Birmingham. The issue of gold tokens was, according to Mr. Timmins, stopped by the Government at the onset, and that of silver, copper, and other metals was, with some temporary exceptions,declared illegal after January 1, 1819. The only coin now produced in Birmingham, is the current copper coin for English and foreign Governments.

Medaling is an important industry, affording considerable employment to the Birmingham die-sinkers. The varieties of medals produced in commemoration of events or individuals are very considerable. Royal births, coronations, marriages, and deaths, anniversaries of schools, churches, chapels, societies, and institutions of almost every kind; weddings, "silvern" or "golden;" laying of foundation stones, or inauguration of public buildings, of every popular hero, or as decorations or prizes for schools and colleges, or for athletic sports. It is noticeable, that almost every metal known to manufacturing industry has been used,at some period or other for striking medals in. An excellent authority, in Birmingham, informs us that most of the ordinary medals are struck either in bronze or tin, the latter carefully refined by the medallist, being the familiar white metal of the "coronation" medals. In bronze medals, the process of "bronzing," which gives their peculiar color, is generally performed before the medal is struck for the last time.

In button-making, the labor of the die-sinker is chiefly expended in livery buttons. The figured gold buttons of the pigtail period, and the sporting buttons, both in horn and metal, fashionable in the early years of her Majesty's reign, many of them of exquisite workmanship, and by first-class artists, have now almost entirely disappeared.

Steel seals, for public and private use, have enormously increased of late, and, as a manufacturer writes, "the demand has been largely augmented by the limited joint-stock companies recently sprung into existence." The enormous development of the envelope trade, and the equivalent demand for stamped note paper, have opened up for the die-sinker quite a new field of enterprise.

Dies for the stamping of ornamental metals are used, of almost every sort and size,varying from two ounces to two tuns in weight. A practical maker remarks that the heavy dies are for the most part cast, and only finished (if finished at all) with the graver or in the lathe. Among the largest dies principally worked by the graver, are those for brass handles and feet, curtain poles, and cornice ornaments.

The processes employed, says Mr. Timmins, are simple, though frequently demanding the exercise of great artistic skill and delicacy of manipulation. In ordinary cases a piece of steel is cast of the requisite shape, round which a collar of iron is welded, in order to prevent the steel cracking when hardened. The surface being prepared,the die-sinker stretches his design upon it, and engraves it, employing for the purpose, gravers with edges of three different shapes—one straight, with the corners rounded, and one semicircular—some forty or fifty sizes of each of these three kinds of gravers being required to suit the varying character of the work, and the special treatment demanded in the several portions of the die. When the engraving is finished, the die is heated and suddenly hardened by cooling; the surface is polished by "lapping," and it is then ready for use in the stamp or press.

THE COCKCHAFER AND ITS RAVAGES.

[By Edward C. H. Day, of the School of Mines, Columbia College.]

Excepting the migratory locust, the cockchafer is perhaps the greatest enemy that the agriculturist of the Old World has to encounter among the entire class of insects. The perfect cockchafers—beetles of the family of Scarabæids, a family of which we intend to give some details on a future occasion—are represented in the upper part of the accompanying illustration, the female being the one crawling over the ground. These insects appear in Europe, in greater or less numbers, every year, during the months of April and May, feeding upon the young and tender foliage of various trees, until after copulation, when the females descend into the ground, there to lay their eggs. From these are hatched the larvæ, small at first, but growing eventually to large, thick, clumsy, inactive, whitish grubs.

During this period, which varies, according to different observers, from two to four years, the discrepancy being probably explicable by diversity in the circumstances of seasons and of food, the grubs feed upon the roots of plants; passing at length, however, into the harmless chrysalis stage shown in the lower left-hand corner of the engraving), whence they finally transform into the perfect beetle.

Happily for us, this insect, so destructive in two phases of its history, is unknown in America, though allied forms closely resembling it in habit occur, and are only less noxious because, as yet, less abundant. Its history, nevertheless, is full of interest to every one, because an enduring lesson of the ignorance of the simplest facts of natural history that prevails among those to whom a knowledge of them would be of the most essential value.

The cockchafer is not, like the locust (we mean the true locust, not the insect commonly so-called in this country, which is a Cicada), an offspring of the grassy wilderness; its abundance is essentially the result of the spread of husbandry; for it is said that it is only within modern times that it has taken rank as a pest, the firm, unmoved earth of unclaimed regions not being so well adapted to the life of the grub as the soils loosened and lightened by tillage. This fact is of significance to us as it suggests the possibility that, under the increase of similar favoring conditions, our native species, already at times a minor trouble, may become a more serious inconvenience, unless we are on the guard against them. The abundance in which the perfect insect occurs in Europe may be best realized from the following quotations. Harris says: "Mouffet relates that, in the year 1574 such a number of them fell into the river Severn as to stop the wheels of the water mills; and, in the "Philosophical Transactions," it is stated that in the year 1688 they filled the hedges and trees of Galway in such infinite numbers as to cling to each other like bees when swarming; and, when on the wing, darkened the air, annoyed travelers, and produced a sound like distant drums. In a short time the leaves of all the trees for some miles round, were so totally consumed by them, that at midsummer the country wore the aspect of the depth of winter."

Kirby tells us that seventy years ago a poor farmer near Norwich and his servant declared that they had gathered eighty bushels of the beetles, and that he was allowed by the court of that city, out of compassion, £25 for the damage that the grubs had done him. Kirby adds that in "1785 many provinces of France were so ravaged by them that a premium was offered by the Government for the best mode of destroying them."

But the evils wrought by the perfect insect during its brief existence of, at the utmost, a few weeks, are nothing compared with those which the grubs effect during their years of underground life. The roots of grass and cereals are alike palatable to them, and their ravages are probably not confined to these but extend to any they meet with, that are sufficiently succulent and tender. It is in these, however, that their evil is most felt. Kirby says this insect "destroys whole acres of grass. . . . It undermines the richest meadows and so loosens the turf that it will roll up as if cut with a turfing spade;" a statement that we can personally corroborate.

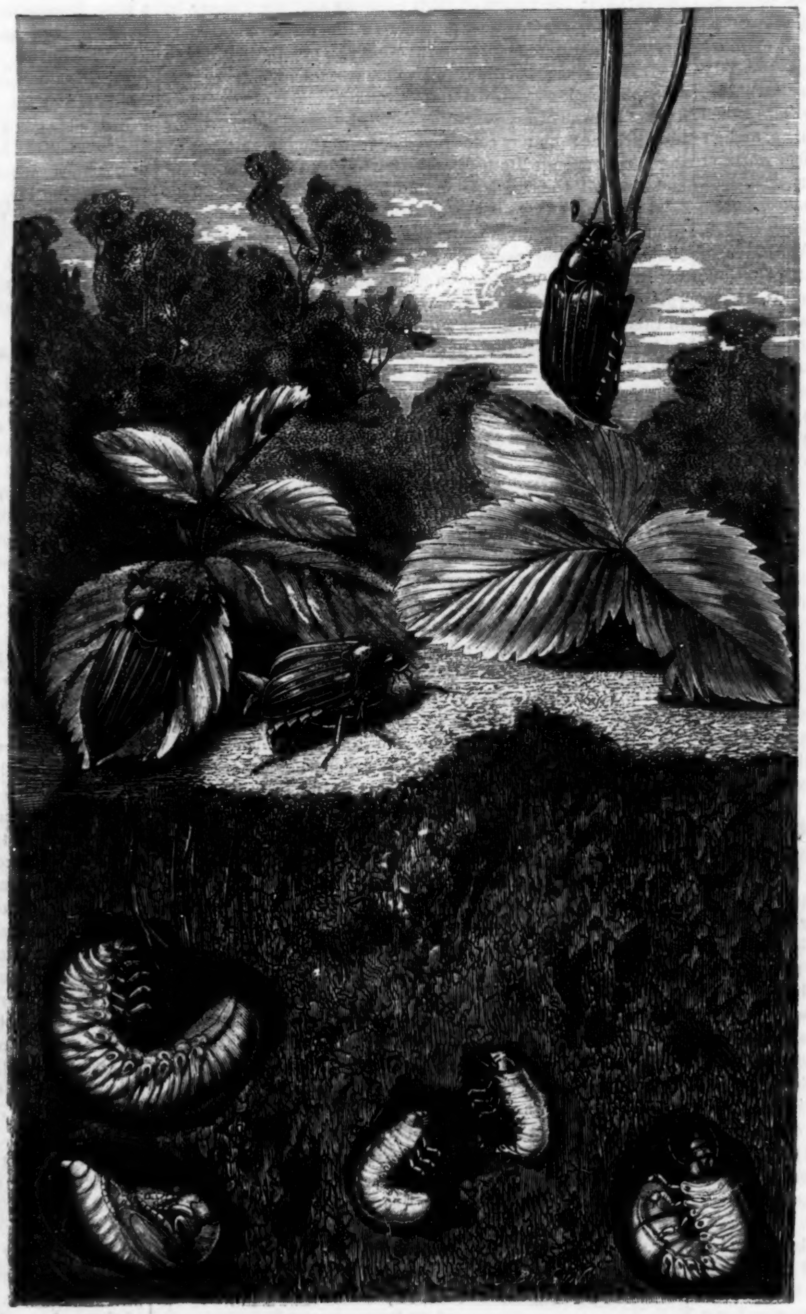
We remember seeing, some years ago, all the grass lands in a rich valley in the West of England converted by these grubs into brown wastes—looking as though they had endured the drought of a tropical dry season. Yet such was the ignorance of the farmers of the cause of this ruin, that one of them asked us to fire at the rooks on his meadow, as "they were tearing up his grass by the roots!" It was in vain that we defended the cause of the birds, protesting that rooks did not feed on grass, and that it was the grubs for which they were in search, that were the real authors of the mischief. "No! No!" was the persistent reply; "Haven't they pulled up every blade of grass all through the valley, and made every meadow look like a plowed field? The ——'d birds!"

Thinking that the farmer's pig-headedness did not deserve the friendly offices of the rooks, we fired a harmless though scaring shot. Scarcely were the birds out of sight before the farmer summoned us to the lower part of the field where his laborers were digging potatoes, to see some "queer-looking grubs" they were turning up. At our suggestion he now dug round a bare patch of what once was grass, and there were the same grubs, busy at their secret destruction! The farmer found, too late, that he had, well—"condemned" the wrong individual; but the birds were gone, and to the best of our belief they had the good sense, notwithstanding the farmer's substitution of prayers for curses, not to return for the benefit of such an incredulous and unthankful ignoramus. As a knowing old rook (undoubtedly) cawed out, "They wouldn't go there to be ——," the final word being lost amidst the indignant cawings of the entire community!

The worst of the story was ("and is") that all the farmers of that ilk ("and of many others, too,") were ("and are") just as grossly ignorant of the commonest facts of that nature amidst which, and upon which, and by which they lived ("and live") as my whilom acquaintance.

N. B. The words above, in brackets, are suggested by a deputation of one from the crows, rooks, jays, cow-birds, robins, sap-suckers, sparrows, skunks, shrewmice, carnivorous beetles, and other "vermin," too numerous to enumerate, that seem to know and care about the farmer, a great deal more than the farmer knows and cares about them. The deputation says that it is not in Europe alone that ignorance prevails on these subjects, but that here in America, where the schoolmaster is abroad, there is still much to be found. But then, as he justly adds, how should the schoolmaster teach when he himself has not been taught on this subject? But let us return to our cockchafers.

(To be continued.)



METAMORPHOSES OF THE COMMON COCKCHAFER.

Poisoning by Carbolic Acid.

The subject of tar poisoning which is now attracting a good deal of attention in connection with the extensive employment of carbolic acid, is not by any means a novel one. It has been long well known that various preparations of tar if applied freely to the skin were capable of absorption, and might bring about certain special symptoms. The reader will find an account of these in Hebra's work on Skin Diseases. Numerous observers have recently met with cases in connection with the use of carbolic acid. It would appear that caution is requisite as to the too free external use of this agent; as it is quite possible to encounter, inadvertently, considerable risk. Although we are not aware of any cases of actual death from its legitimate surgical use, we know of several in which alarming symptoms occurred. Dogs are very easily killed by carbolic acid baths. The remedy is the free use of diluents taken by the mouth; and it is equally useful if employed as a precaution.

Indian Moccasins.

"We recently examined," says the *Shoe and Leather Reporter*, "a pair of mocc sins, the workmanship of old 'Mother Friend' a squaw of Shakopee's band of the Sioux Indians, whose village, only fifteen years ago, occupied the site of the now thriving town of Shakopee, Minnesota.

"They are made of buckskin, fine and white, and soft as velvet, the squaws surpassing in the excellence of their tanning and dressing of skins. The instep is an ornamental piece, of porcupine strips of variegated colors, set in and braided together as in basket work; the seams are all on the upper part, the sewing being done with fine selected sinews of the deer; at the ankle is attached a high, encircling flap, to which are buckskin thongs to wind about the leg and tie in front.

"Moccasins are much worn by the women of the far West as house slippers, and, in the dry season, are preferred by pedestrians on long journeys. In the very still, cold weather of the inland high latitudes, they often prove the warmest covering for the feet that the hunters and pioneers can procure, though having at command the most approved devices of the sons of St. Crispin.

"To the uninitiated, the moccasins of the different tribes seem so much alike as hardly to be distinguishable, yet they each present to those wise in those trifles that make the sum of human wisdom, traces by which they may be as easily detected in their origin as our own trade oracles determine an Eastern from a New York shoe, or it may be fix its exact locality. Indeed, the imprint of the moccasined foot in the dust on the well worn trails of the prairie, or the muddy margin of the stream or lake, will indicate unerringly to the experienced eye the trace of friend or foe. The white man's foot is wide or large, turned outward. The Indian's foot is usually narrow, medium sized or small, the track straight, or turned slightly inward; two little tabs wide apart at the heels betray the Dakota or Sioux. One tab marks the Winnebago, three the Chippewa. These distinguishing marks are no doubt meant to indicate nationality, as also, the mode of dressing the hair, or any other feature of the costume which, though it varies among tribes, may be described generally and briefly, as breech cloth and nakedness, blanket and paint.

"The manufacture of moccasins is one of the few branches of legitimate industry, that, systematically pursued, provides a welcome addition to the scanty living that hardly suffices to save the skulking bands on the frontiers from starvation. The moccasin of the Sioux, cheap and durable, is considered the best for service, and ranges in value from 50 cents (cosh poppi zopta), to $1·50 (Murzez skar tonka, cosh poppi zopta), in specie, for your copperhead of the plains, proudly ignorant of finance, scorns the greenback.

"The moccasins of a chief, or a brave, are not less important auxiliaries of dress than are this portion of the dress of a fashionable lady in civilized life; and in full dress, trailing in the dust from the heels of the 'Bucks,' may often be seen otter skins that would bring fabulous prices on Broadway; or other costly fur skins, ornamented with so much of skill and expenditure of labor as to make them valuable indeed.

"The superlatively beaded wash leather imitation moccasins exposed for sale at Niagara, or peddled in the streets of Eastern cities by degenerate mongrels of historic races, are not those of which we are writing. As a curiosity, the latter may answer every purpose, and as a souvenir they may satisfy the tourist; but if one would know what a genuine Indian moccasin really is, he must go to other sources of supply then these, for they are seldom found in aboriginal purity except among the Indians of the Plains."

SALT IN THE AIR.—From a series of observations, conducted with great care at Monaco, on the shores of the Mediterranean, a French scientist reports to the Academy the presence of a stratum of air two hundred feet high, extending for miles inland, which is constantly impregnated with saline particles. This saline stratum, the writer asserts, is found on all sea coasts, is independent of barometric pressure or the hydrometric state of the atmosphere, is due to the "pulverization" of the sea water by the breaking of the surf upon the rocks. He contends that the phenomenon he points out must not be confounded with what is commonly known as spray, which is of a coarse nature and entirely local in character.

The Rider Cut-off Engine.

In introducing this engine to the notice of our readers, we do not deem it necessary to preface our remarks by a discussion of the value of the method of using steam expansively. This subject is worn threadbare, and anything we could now say would be only a repetition of what we have already said. The system is now generally adopted by the steam-using public.

The valve gear of the engine of which we give engravings, is remarkable for its extreme simplicity, its delicacy and certainty of action, and the very slight space it occupies. Durability, the offspring of simplicity, it possesses in a very high degree; and it is entirely devoid of certain delicate niceties of construction, which in some other kinds of valve gear necessitate constant attention and frequent repairs.

The delicacy and precision of its action is amply attested by indicator diagrams, taken by a well-known expert of this city, which diagrams we have personally examined with much interest. These cards indicate that with proper adjustment this gear can compete in economical results with many others, which have acquired a very high reputation, but which are far more expensive and complicated.

The cut-off valve is shown, seated upon the back of the principal valve, in Fig. 2. Its face is a true segment of a cylinder, working in a corresponding recess on the back of the main valve. The ends of the cut-off valve are not square, but are inclined toward each other, forming a contour resembling the line of screw-threads cut in opposite directions, but having the same pitch. The parts in the back of the main valve are cut at a corresponding angle. It is evident that if the cut-off valve be placed so as to cover the ports in the principal valve, a reciprocating motion of the cut-off valve spindle will open and close the ports alternately. It is also evident that if the spindle be rotated in the direction of the widest part of the face of the cut-off valve, while it has no other motion, both ports will be simultaneously uncovered, and covered again by reversing the direction of the rotation. This rotation is imparted to the spindle from the governor, as the velocity of the engine increases or diminishes, while the reciprocating motion is received from a special eccentric on the crank-shaft. The combined action of these motions produces a variable cut-off, capable of cutting off at any part of the stroke. For when the spindle is rotated toward the wider part of the face of the cut-off valve—which is the case whenever the speed of the engine slackens, the cut-off is retarded, and the reverse takes place whenever the engine runs faster than the correct speed.

The excentric is connected with the cut-off valve spindle by means of a swivel joint, so that the rotary motion de scribed is not interfered with. The latter motion is imparted through a simple system of toothed sectors, not distinctly shown in Fig. 1, and which does not need special description. The speed of the engine is established or changed by weights like those used on common platform scales, placed upon a stem attached to a rack, which transmits motion from the governor to the toothed sectors, alluded to above.

Besides the valve gear the general design of this engine is worthy of special notice. The fly-wheel is placed near the bottom of the engine, and the cylinder at the top, an arrangement which secures great steadiness. The general form of the upright portion of the engine is such as to economize space to the utmost.

An engine with cylinder 18" by 24", making 110 revolutions per minute, and developing 152-horse power when cutting off at full stroke, or 129-horse power when cutting off at half stroke, occupies only 6 feet 8 inches over all on the floor, and stands only 13 feet in hight.

The workmanship is also first class. The crank shafts are of solid wrought iron, with two bearings of ample size to secure durability. On an engine of the size specified in the preceding paragraph, the crank shaft is 6·5 inches in diameter, and its principal bearing is 18 inches in length, and these dimensions are of proportionate extent on other sizes of engines.

Patent oil cups are placed on every bearing, so that the engine needs oiling, on the average, not oftener than once in three days. The cylinders are handsomely lagged, and a new style of crosshead to which the piston-rod is keyed is employed. All the gibs and keys are provided with keepers.

The clearance is reduced as nearly to a minimum as possible, there being an aggregate of only 42·51 cubic inches in a cylinder 8" by 10" inclusive of all valve ports and passages.

It is officially attested by Mr. F. W. Bacon, of this city, who tested one of these engines with the indicator that it gave an economical result of one-horse power for every 5·19 pounds of coal consumed per hour, steam being supplied from a boiler so defective that it evaporated only 4·80 pounds of water for every pound of coal consumed.

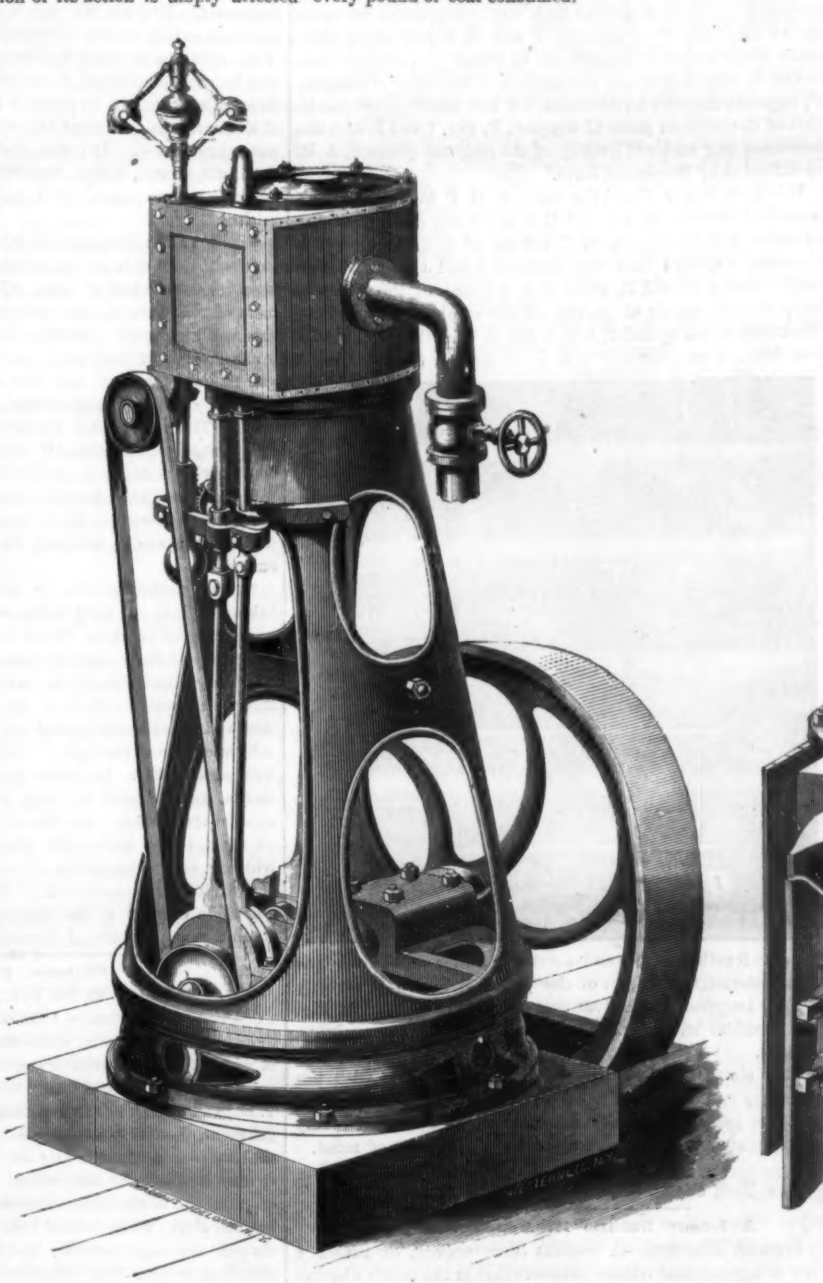


Fig. 1.

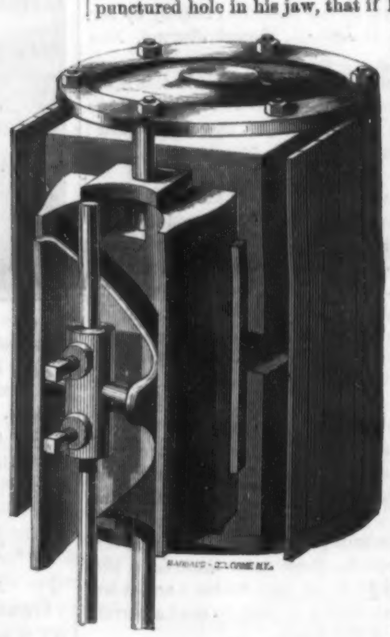


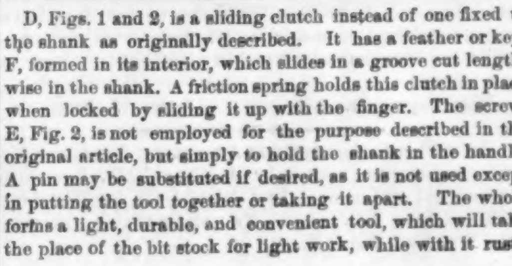
Fig 2.

THE RIDER CUT-OFF ENGINE.

For further particulars address Handren and Ripley, Albany Street Iron Works, corner of Washington and Albany streets, New York.

Drummond's Improved Screw-Driver.

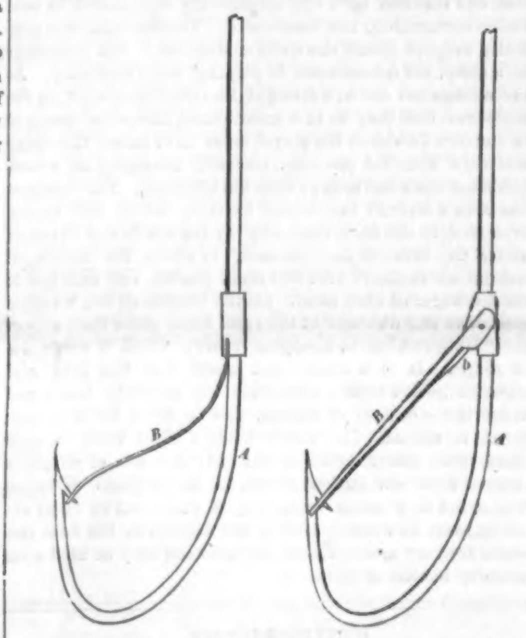
The description of this implement, the invention of David Drummond, of McGregor, Iowa, published and illustrated on page 318 current volume, to which the reader is again referred, contains an error into which we were led by the imperfect description furnished us by the inventor. We give herewith a detail engraving of that part of the instrument incorrectly shown and described. Similar letters are used to refer to similar parts in this and the original engraving.



D, Figs. 1 and 2, is a sliding clutch instead of one fixed to the shank as originally described. It has a feather or key, F, formed in its interior, which slides in a groove cut lengthwise in the shank. A friction spring holds this clutch in place when locked by sliding it up with the finger. The screw, E, Fig. 2, is not employed for the purpose described in the original article, but simply to hold the shank in the handle. A pin may be substituted if desired, as it is not used except in putting the tool together or taking it apart. The whole forms a light, durable, and convenient tool, which will take the place of the bit stock for light work, while with it rusty or large screws may be put into wood with much greater ease than with the ordinary screw-driver.

KEMLO'S SPRING-LOCK FISHHOOKS.

The fishhook is one of the oldest implements by which man has been able to draw from the treasures of the watery world a portion of his necessary sustenance. But it is a long way from the rude bone hook of the savage to the



delicate steel fishhook of modern times, exquisitely finished, and possessing such a "taking way" that the fish once induced to swallow the dainty morsel which conceals its subtile point, escapes, if he escapes at all, only by dint of a severe and protracted struggle.

The ordinary modern hook, however, is not as reliable as is desirable. A strong fish, by his struggles, so enlarges the punctured hole in his jaw, that if he can secure a moment's relaxation of the line, he can shake the hook out and free himself, and from this cause many an angler has had to content himself with a "capital bite," instead of the splendid fish he had set his heart upon taking.

The fishhooks illustrated herewith admit of no such mortifying contingency; the fish must either tear his jaw entirely through, or yield himself a captive to the art of his ensnarer, for besides the ordinary barb it comprises a spring lock, which prevents the fish from releasing himself in the manner alluded to.

When the point of the hook has penetrated the fish's jaw, the lock will be pushed downward and backward by it. If now, by the struggle of the fish to get away, or by the pull of the fisherman, a slit be torn in its jaw, the outer loose end of the lock will pass out of the mouth of the fish, and at once be thrown up by the spring and close the hook, thus making it impossible for the fish to escape, unless its jaw be torn in two.

The inventor of this improved fishhook is also the patentee of a fine grapple hook, calculated for fishing through the ice, or to be used on set lines left to be taken up at regular periods. The construction and action is such, that a fish may get caught by the grapple-hooks by only pulling at the bait; it sets itself after all pulls at the bait, except when drawn entirely down.

The patents on these hooks cover the proportionate lengths of the barbed ends of the hooks, as well as the spring locks.

For further information address F. Kemlo, 146 Washington street, Boston, Mass., who will furnish circulars describing and illustrating all the various numbers and styles.

Trial Trip of the "City of Merida."

This vessel, of F. Alexander and Son's Line, underwent her trial trip May 24th. She is intended to run as companion vessel of the *City of Mexico*, between New York and Vera Cruz, touching at Havana and Sisal. She was launched Feb 23, of the present year, from the yard of the builders, John Englis and Son. She is 236 feet in length, with 37 feet breadth of beam, and a clear depth of 26·5 feet. Her engine was built by the Delamater Iron Works. The cylinders are 56" bore, by 54" stroke, and, at sixty revolutions per minute, develop 1,000-horse power. On the trial trip with an average of 53 revolutions per minute, she made the run from the Battery to the light-ship, a distance of 26 miles, in 2 hours and 11 minutes. Great satisfaction was expressed at her behavior in all respects.

The Parent of the Pianoforte.

Brinsmead, in his "History of the Pianoforte," expresses the view that the dulcimer was the instrument from which the pianoforte had its origin. In the ancient Assyrian dulcimer the strings passed completely over the sounding board, and were of varying lengths. From the manner in which the strings run in this dulcimer, it is evident that they must have passed over a bridge before they took a vertical direction, but this has been very imperfectly represented in bass reliefs representing the instrument. The dulcimer was generally fastened round the waist or shoulder of the performer by a strap, for convenience in playing while marching. As the strings ran out in a straight line from the player, in the same way that they do in a grand piano, instead of across as in our own dulcimer, the player must have struck the string sideways with the plectrum, probably twanging an accompaniment upon the strings with his left hand. The dulcimer has been a favorite instrument for ages, and is well known even now in the East, especially by the Arabs and Persians, under the name of the "Kanoon," in which the lamb's-gut strings are twanged with two small plectra, one attached to the forefinger of each hand. On the Continent, too, we often meet with the dulcimer at the rural fêtes, under the name of the "Hackbret" (*i. e.*, chopping board), which it resembles in shape. It is a square box about four feet long and eighteen inches broad, containing the sounding board and about three octaves of strings, two or three to each note, tuned in unison. The player holds a short stick in each hand, with round knobs at the end, one side of which is covered with soft leather or felt, for use in piano passages. The sound is pleasing when played piano, but as there are no dampers like those used in the pianoforte, the forte passages are very confused, and the hand can only be used occasionally instead of them.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

An Old Piano.

MESSRS. EDITORS:—I notice an article in your paper of March 26th, 1870, giving some account of a piano made by an Italian firm in the city of London, in the year 1786, and recently presented to the New Haven Historical Society by Mr. C. M. Loomis, publisher of *Loomis' Musical Journal*, New Haven, Conn.

It is claimed for this piano that it is the oldest in this country. I have had in my possession about two years a piano which bears the following inscription upon the name-board: "Johannes Zumpe, Londini, Fecit, 1768, Princess street, Hanover Square."

Mr. Karl Merz, in an article in *Brainard's Musical World* for August, 1869, states that pianos were first introduced into London about the year 1760, by one Zumpe. This one doubtless is of his manufacture.

It is of solid mahogany, four feet three inches long, eighteen and a half inches wide, and twenty-seven inches high. The legs are about two inches square. It has no pedals, but the dampers, which run the whole length of the instrument, are operated by two levers in the left hand corner. It is two keys short of five-octaves compass.

The keys are made of ebony, and the short ones are covered with strips of ivory, so that the colors, as compared with recent pianos, are reversed—the short keys white and the long ones black. Upon the whole the keyboard is rather dismal in its appearance.

The original tuning hammer, entirely of iron, and very neatly made, is still preserved. It seems in those days that every player was expected to do his own tuning; and it was not unusual, when one was invited to play, to send a servant to another room to carry in the piano.

You will see by the date that this piano is eighteen years older than the one presented to the above Society by Mr. Loomis.

E. VOSSELLER.

Flemington, N. J.

Street Paving and Sewerage in Russia.

MESSRS. EDITORS:—As we are considered by the postal authorities in Moscow, the oldest subscribers here to your very valuable paper, we request your kind assistance in the following matter, and trust that some of your correspondents may favor us with their advice.

In the cities and towns of Russia the street paving is entirely composed of pebbles, varying in size from 3" to 9" diameter, it naturally follows that at the breaking up of the winter season the streets are entirely out of repair, so that for a few weeks it is utterly impossible to carry more than half loads, or to travel with any degree of safety. Russian law requires that every householder shall patch his own frontage, therefore, the cheaper that is done the better it is!! Should the town authorities undertake the repairs, the bad system of wood drains would not allow for heavy street rollers, otherwise the wooden bore sewers would be crushed; and in fact the generality of the town councils have not the cash in hand to undertake any improvements either in system or repair—at present a stone in one hand for the hammer, the other stones laid being tapped affectionately on the head by the child, boy or man; the traffic has then to consolidate the road, and that is the system. Are there any cheap inventions, patented or otherwise, that would, with one or two men power, give the householder a chance of hammering the roads properly? if so, we should be most happy to entertain any proposal if the invention be of a real and practical service.

Moscow, Russia.

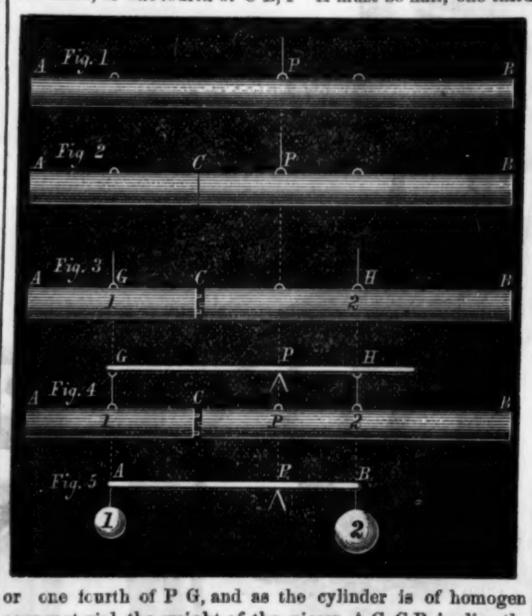
SWANN & Co.,
Engineers and Architects.

Equilibrium of the Lever.

MESSRS. EDITORS:—In answer to the question as to the equilibrium of the lever (page 315), it must be observed that the laws of forces and motion, or dynamics, cannot give as simple an explanation of it as the laws of statics, by which we may reduce the principles of the question, to those of the support of the center of gravity of a system of bodies. In order to make this practically evident, I had, many years ago, a little arrangement constructed which I used in my lectures, and of which the following will give an idea:

A cylinder of homogeneous wood of about two inches in diameter and 24 inches long, A B, Fig. 1, is suspended from the center of gravity, P, and of course makes equilibrium; then it is shown to consist of two pieces, A C and C B, Fig. 2, of which the first is 8 and the second 16 inches long, and which are joined together at C by a few well-fitting pegs and corresponding holes; if separated each can be suspended by cords at its own center of gravity, G and H, Fig. 3, while then again these suspending cords can be joined by a straight rod, G and H, Fig. 4, in which the position of the point of support, P, required to make equilibrium for the whole, must be in line of the original point of support, P, Fig. 1 and 2, and the corresponding center of gravity of the original cylinder, A B, as indicated by the dotted lines.

It is clear that in Fig. 4 the ratio of G P to P H will always be inversely, as A C and C B, as for any division of the cylinder, A B, by the cut in C, taking off $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, etc., G is necessarily always half way between A and C, and H half way between C and B, while the position of the point of support and center of gravity of the whole P is constant. Therefore if the cylinder, A B, is cut in C, so that A C is half, one third, or one fourth of C B, P H must be half, one third,



or one fourth of P G, and as the cylinder is of homogeneous material, the weight of the pieces, A C, C B, is directly as their lengths. It is clear that the case illustrated in Fig. 5 is identical with Fig. 4, except in the form of the weights, 1 and 2.

This simple contrivance served me (of course with the necessary explanation), for many years, to meet questions like that on page 315, on this subject, which I found to be very common among students of a philosophizing turn of mind.

P. H. VANDER WEYDE, M.D.

New York city.

A Lusus Naturæ in Peach Blossoms.

MESSRS. EDITORS:—A curious *lusus naturæ*, or rather a law of agricultural science is observable in the peach blossom of this year, producing twins or triplets. That this is the result of a general law is evident from the concurrent testimony of widely distant regions, and on both shores of the Chesapeake.

The Agricultural Report for 1866 (p 203) states that peaches are grown with complete success only after the ground has rested for a period of twenty years, during which time the peach district moves from North to South about fifty miles, and then returns at a single leap to the place of beginning.

By calling attention to these facts the cause of agricultural science might be advanced. Is there a periodicity in the former case as in the latter? Has this twin development been observed above the 39th parallel?

Baltimore, Md. GEO. A. LEAKIN.

Eel-Skin Belt Lacings.

MESSRS. EDITORS:—I noticed an inquiry, some time since about eel skins. I would say that from them are made the most valuable strings for lacing belts in the world; one lace or string will outlast any belt, and will stand wear and hard usage where hooks or any other fastening fails. The way we get them and use them is as follows: Our mill being on the bank of the river we keep our net set for eels, which when wanted are taken out in the morning, skinned, and placed or stuck on a smooth board. When dry we cut them in two strings, making the eel skin in three hours from the time it was taken from the water travel in a belt 5,000 or more feet per minute.

Williamsport, Pa. JAMES W. BENGLER.

THE first book stereotyped in America was *The Larger Westminster Catechism*, revised by A. M'Leod, D.D., New York, stereotyped and printed by J Watts & Co., for Whitting & Watson, June, 1813. 12mo. Two copies of this work are in the New York State Library

Food in Paris.

The French do not enjoy their food without suspicion any more than we do, but they seem to take tolerably energetic measures toward securing the purity of the articles they consume. A French journalist, wondering about what he calls the "ham fair," says he suddenly became aware of a great tumult not far from him, and turning to ascertain the cause, perceived a cart which appeared to belong to some employés of the Prefect of Police, and which was fast filling with hams, sausages, and other savory articles, amid much laughter and plenty of "chaff." The operation came to an end, and the agents of the Perfect were about to retire, when curiosity prompted the amused spectator to enter into conversation with one of them respecting this strange scene. "Sir," said this individual with honest pride, "Paris has no idea of the services we render it. But for us the population would be decimated. You see, Sir, that in a town like this, in which you must satisfy nearly 2,000,000 appetites daily, the supply of the public need offers facilities for imposition which would lead to universal fraud if some measures were not taken. Everything that can be eaten or drunken tempts the cupidity of adulterators. It would be well if innocuous frauds alone were perpetrated. He who adulterates coffee with chicory, chestnuts, acorns, potato, beet root, carrot, turnip, and maize, can give no one gastric fever, but some will employ ground bricks!

"Oil may be adulterated in thirty-eight different ways. As to this, it need only be remarked that Paris consumes more than 1,000,000 liters of salad oil; but only 100,000 liters at most of real olive oil find their way to the capital. What is the rest made of? Truffles are made at will with yams, mushrooms, and even cork. In the lowest class of restaurants you find cats', horses', and even rats' flesh cooked. Yes, Sir, without continual supervision, continual mishaps would occur. This supervision is exercised in the most varied forms. Sixty inspectors incessantly keep watch over the butchers' meat; wine testers are employed to judge of the beverages sold in 3,000 Parisian public houses. At the Halle, seventy persons are employed solely to ascertain, by holding eggs up to a lighted candle, whether they are fresh enough for consumption.

"As to ourselves, Sir, we form part of the scenting-out brigade. It is our duty to discover by the smell the condition of all sorts of eatables offered for sale. We begin our work every day at eight o'clock, generally arranging not to pass over the ground already reconnoitered by our colleagues; but this we sometimes have to do, as those tradesmen whose goods have been overhauled are very apt to think themselves safe, and take advantage of their fancied security to make dishonest profits. In twelve months we visit 2,500 establishments, and we have to bring about twenty actions a week against tradesmen. All comes under our jurisdiction—tainted meat, rotten fruit, milk adulterated with horses' brains, whiting, etc. This is not all; we have to examine the state of the kitchen utensils in the 5,800 restaurants, eating houses, and table d'hôtes of the capital, otherwise verdigris would claim a yearly tribute of victims."

Chinese Printing.

We are indebted to Mr. P. R. Hunt, of Peking, China, for a description of a font of Chinese movable types, with a photograph of the cases in which the types are distributed and at which the compositor stands when at work. The cases are used in the office of the American Mission Press (A. B. C. T. M.) at Peking. A Mr. Gamble, connected with the establishment, has invented a plan by which the multitude of characters in a Chinese font are brought within comparatively easy reach of the compositor. There are three frames, one on each side of the compositor, and another in front, all having but one slope, while behind him is a galley-top table; the V-shaped openings between the frames are filled with corresponding covers. The whole occupies 8 feet by 10, and looks like a huge hopper. The characters are grouped in small cases and arranged, face outward, over this slanted surface. The first sight of this "sea of faces" must produce only bewilderment on the part of the unfortunate typo; however as each box has its character written on it, and all systematically arranged, he soon learns his task, and selects his characters with ease and rapidity.

Cement for Glass Prisms.

The best cement for putting together glass prisms, to be filled with carbon disulphide (bisulphide of carbon), is a mixture of common glue and West India molasses. Make a tolerably liquid glue, and add about one eighth the quantity of common molasses. Lay the metal or glass form, ground to a suitable angle, with its face up; then place the glass plate upon it, and apply the cement on the under side with a brush, and allow it to flow by capillary attraction between the glass and the form; repeat this operation several times if necessary. This is better than to wet the edge of the glass at the outset before attaching it to the prism. The stopper to the prism can be cemented in the same way, and in filling with the carbon disulphide, always leave a small space for the expansion of the liquid. The prisms want to be kept in a cool, dark place, and ought not to be agitated previous to using, as the light is in that case unequally refracted

IT is said that collodion is a good varnish, by means of which the cause of the decay of eggs—viz., the porosity of the shell, and, hence, access of air to the interior, may be prevented. The author of this method, Mr. S. Martin, also mentions that the soundness of eggs may be tested by immersing them in water containing 30 per cent of common salt in solution; in this brine, good and sound eggs sink while bad eggs float.

NEW YORK LYCEUM OF NATURAL HISTORY.

HISTORY OF LOST ELEMENTS.

At a meeting of the Lyceum of Natural History, on Monday, May 16, Dr. H. Carrington Bolton read an interesting paper on the history of chemical elements that had been proposed by chemists, but had not been proved to be new substances, and had hence been dropped from the rolls. The list is longer than is generally supposed, and may serve as a warning to ambitious chemists not to be too hasty in naming their bantlings before they are fairly hatched.

At the time of Aristotle there were only four elements—earth, air, fire, and water. Somewhat later, the alchemists were content with three, mercury, salt, and sulphur. Previous to the year 1700 not more than thirteen bodies had been discovered to which the name element could properly be applied; but during the eighteenth century sixteen new substances were added to the list, all of which have stood the test of the more accurate methods and knowledge of the present day. While the number of genuine elements was thus largely increasing, a longer list of supposed new bodies was swelling by its side. There was a rage for finding something new in every rock and every ore, and the prospect appeared fair of our having as many elements as there were species of minerals on the face of the earth.

Fortunately for the convenience of study a majority of the attempts to coin new names were frustrated by the more acute learning and profounder skill of the chemists of modern times. A complete catalogue of the hypothetical elements is nowhere to be found, and Dr. Bolton has rendered an important service by compiling it. The following is an abstract from his paper:

Terra Nobilis, discovered by Bergmann in 1777, turned out to be the diamond.

Hydrosiderum, of Meyer, 1780, proved to be a compound of phosphorus and iron.

Australium, Josiah Wedgewood, thought that he had found something new in 1790 in some sand from Sydney, New South Wales, but Hatchett showed that it was only a mixture of alumnia, silica, and iron.

Agustum, discovered in 1800 by Trommsdorff, in what was known as Saxon beryl, proved to be phosphate of lime, or apatite.

Silenium, by Proust, in 1803, proved to be uranium.

Niccolanum, 1805, by Richter, closely resembled nickel, but differed from that metal in ductility—Berzelius showed that it was nickel containing six per cent of cobalt, with some iron and a little arsenic.

Andronia, of Professor Winterl, was ignominiously dismissed as being chiefly lime and alumina derived from the crucible of the operator.

Thelike, by the same discoverer, met with a similar fate.

Nitricum is the element which, united with oxygen, gives us nitrogen.

Araeon was ponderable caloric.

Murium combined with Araeon, water, and oxygen gives us muriatic acid.

Junonium, discovered by Professor Thomson in 1811, proved to be identical with cerium.

Thorium.—Berzelius thought that he had detected new earth in 1815, and called it thoria—he soon found that it was phosphate of yttria and abandoned the name, but in 1828, having the good fortune to discern something really new, he revived the name thorium, and it hence remains on our list of true elements.

Vestium, discovered in 1818 by von Vest of Gratz, called after the planet Vesta, but also very suggestive of the name of its discoverer, was shown by Faraday to be a mixture of nickel, iron, sulphur, and arsenic.

Wodanium, 1818, from the Scandinavian deity *Woden*, from whom we derive Wednesday, also proved to be nickel, iron, and sulphur, with cobalt.

Crodonium, 1820, by Trommsdorff, named from *Crodo*, an idol, held in much veneration in Thuringia, proved to be lime, magnesia, iron, and copper.

Pluranium and *Polinium*, by Osan in 1828, in platinum ores, never survived their baptism, and have utterly disappeared from our nomenclature.

Donium.—In 1836 Davidson submitted a mineral found near Aberdeen, Scotland, to Professor Thomson for analysis. The mineral was named davidsonite, and was thought to contain a new earth, the identity of which with glucina was shortly afterwards proved. Davidsonite is in fact a greenish yellow beryl.

Treenium, in 1836, by Boase, from Treene, Lands End, has not been mentioned since the first announcement of its discovery.

Terbium.—In 1843 Mosander discovered in the mineral gadolinite two new elements, which he called terbium and erbium, from contractions of the name of the town of Ytterby, where the stone was found—terbium by dropping the initial Y, and erbium by dropping the initial T. In 1860, Berlin pronounced terbium to have no existence, and showed that Mosander had been misled by traces of uranium and glucinum in the mineral under examination.

Pelopium, Niobium.—In 1801 Hatchett discovered Columbium in an American mineral; the following year Eckeberg found tantalum in a Swedish mineral. Wollaston pronounced the two elements to be identical, and his opinion was accepted as conclusive until 1846, when Henry Rose thought that he could prove the existence of two new oxides in the American mineral, the metals of which he proposed to call niobium and pelopium, from the children of Tantalus. Subsequent researches have shown that he was mistaken, and that Wollaston was also in error, and that the columbium of Hatchett and the tantalum of Eckeberg are elementary substances, and hence niobium and pelopium are wiped out of existence.

Ilmenium, of Hermann, 1846, was the occasion of much controversy at one time, but by common consent is now considered to be a compound of columbium.

Norium, announced by Svanberg as occurring in zircons, may prove to be the metal jargonium, recently found and lost by Dr. Sorby, at Augrete. We have heard nothing further from it since its first discovery.

Aridium was so named from two Greek words, meaning resembling iron; it has since been shown to be iron itself, and thus disappears from our list.

Donarium, of Bergman, 1851, proved to be thorium.

Thalium.—In 1852 Owen discovered in a mineral from Lake Superior what he supposed to be a new earth, it was shown by Dr. Genth to be a mixture of magnesia and lime.

Dianium was announced by von Kobell to exist in tantalite from Finland, but its claims to recognition have been strenuously opposed by Rose, Deville, Hermann, and others; it must be consigned to the same category as ilmenium, niobium, and pelopium.

Wasium, in 1862, by Bahr, was supposed to occur in a variety of allanite; as the mineral contains thirteen different oxides, it is perhaps excusable if a chemist becomes somewhat confused in his analysis of it. Wasium is a mixture of thorium and yttrium.

Jargonium, 1868, by Dr. Sorby, has recently been given up by its discoverer and announced to be zirconium, with minute quantities of uranium.

The above is a tolerably complete list of defunct elements, and will be convenient for reference.

ITALIAN MARITIME EXPOSITION.

The Italian Government has set on foot a grand International Maritime Exposition, which is to take place at Naples, commencing Sept. 1st, and ending Nov. 30th of the present year. Everything relating to the construction and equipment of vessels is to be admitted, and there are to be ten divisions, as follows:

1st Division.—Naval construction.

2d Division.—Steam engines.

3d Division.—Ports and maritime establishments.

4th Division.—Wood, metals, and combustibles.

5th Division.—Articles, and materials for rigging and arrangement of ships, and for navigation in general.

6th Division.—Implements connected with navigation, preparation for salvage, and arms for the commercial marine.

7th Division.—Victualing of ships, and sailors' movables.

8th Division.—Fishery.

9th Division.—Scientific section.

10th Division.—Principal merchandise and articles for export of Italy.

Each division is subdivided into classes. Gold, silver, and copper medals are to be distributed. This will be an excellent opportunity for our citizens to exhibit their improvements abroad. Further information can be had on application to the Italian Consul, No. 7 Broadway, New York city.

A NEW SPRING AT SARATOGA.

A new spring called the "Geyser," has been discovered about two miles from Congress Hall, Saratoga, after boring 160 feet. It spouts up after the manner of oil wells every two or three minutes, throwing water and gas fifty feet high.

The following is an analysis of this interesting mineral water, made in the laboratory of the School of Mines, of Columbia College, under the direction of Dr. Chandler: One U. S. gallon of pure water holds 231 cubic inches and weighs 58,318 grains. One gallon of the Geyser spring water weighs 58,959·498 grains, and contains

	Grains.
Chloride of sodium	562·080
Chloride of potassium	24·634
Bromide of sodium	2·212
Iodide of sodium	0·248
Fluoride of calcium	Trace
Bicarbonate of lithia	7·004
Bicarbonate of soda	71·232
Bicarbonate of magnesia	149·343
Bicarbonate of lime	170·392
Bicarbonate of strontia	0·425
Bicarbonate of baryta	2·014
Bicarbonate of iron	0·979
Sulphate of potassa	0·318
Phosphate of soda	Trace.
Biborate of soda	"
Alumina	"
Silica	0·665
Organic matter	Trace
Total solid contents	991·546
Water	57,967·952
Weight of one gallon	58,959·498
Carbonic acid gas in one U. S. gallon (cubic inches)	454·082
Density of the water	1·011
Temperature	46° F.

Dipping Fluids.

BROWN BRONZE DIP.—Iron scales, 1 lb.; arsenic, 1 oz.; muriatic acid, 1 lb.; zinc (solid), 1 oz. Let the zinc be kept in only while it is in use.

GREEN BRONZE DIP.—Wine vinegar, 2 qts.; verditer green, 2 oz.; sal-ammoniac, 1 oz.; salt, 2 oz.; alum, ½ oz.; French berries, 8 oz.; boil the ingredients together.

OLIVE BRONZE DIP FOR BRASS.—Nitric acid, 1 oz.; muriatic acid, 2 oz.; add titanium or palladium, as much as can be dissolved by the acids; when the metal is dissolved, add 2 gals. of pure soft water to each pint of the solution.

Effects of Cyanogen on Health.

Speaking of this subject Napier's *Manual of Electro-Metallurgy* says:

"The effects produced upon the health of those who work constantly over cyanide solutions are not yet fully tested, by which we could form a comparison with the old process; for every new trade, or operation, gives rise to a new disease, or some new forms of an old disease. Having ourselves inhaled much of the fumes of that '*ominous*' gas given off from the cyanide of potassium solution, we are not prepared to stand its advocate, but would rather warn all employed at the business, or who may in any degree have to do with these solutions, to be very careful not to use too much freedom. The hands of those engaged in gilding or plating are subjected to ulceration, particularly if they have been immersed in the solution. We have repeatedly seen, by the aid of a magnifying glass, gold and silver reduced in these ulcerations. We have also known of eruptions breaking out over the bodies of workmen after inhaling those deleterious fumes when they were very bad, as when solutions were precipitated by acids or being evaporated to dryness in a close apartment for the recovery of the metal. Repeatedly have we seen the legs of workmen thus afflicted, and always after they have been exposed to extra fumes.

"The following statement of the general effect of electroplating and gilding on the health of those engaged in them, as experienced by ourselves and others, may not be uninteresting to our readers; but it is necessary to premise that the apartments in which we were employed were improperly ventilated.

"The gas has a heavy sickening smell, and gives to the mouth a saline taste, and scarcity of saliva; the saliva secreted is frothy. The nose becomes dry and itchy, and small pimples are found within the nostrils, which are very painful (we have felt these effects in the nose from the hydrogen of the batteries, where there were no cyanide solutions). Then follows a general languor of body; disinclination to take food, and a want of relish. After being in this state for some time, there follows a benumbing sensation in the head, with pains, *not* acute, shooting along the brow; the head feels as a heavy mass, without any individuality in its operations. Then there is bleeding at the nose in the mornings when newly out of bed; after that comes giddiness; objects are seen flitting before the eyes, and momentary feelings as of the earth lifting up, and then leaving the feet, so as to cause a stagger. This is accompanied with feelings of terror, gloomy apprehension, and irritability of temper. Then follows a rushing of blood to the head; the rush is felt behind the ears with a kind of hissing noise, causing severe pain and blindness: this passes off in a few seconds, leaving a giddiness which lasts for several minutes. In our own case the rushing of blood was without pain, but attended with instant blindness, and then followed with giddiness. For months afterwards a dimness remained as if a mist intervened between us and the objects looked at; it was always worse towards evening, when we grew very languid and inclined to sleep. We rose comparatively well in the morning; yet were restless, our stomach was acid, visage pale, features sharp, eyes sunk in the head, and round them dark in color; these effects were slowly developed. Our experience was nearly three years.

"We have been thus particular in detailing these effects, as a warning to all employed in the process; but we have no doubt that in lofty rooms, airy and well ventilated, these effects would not be felt. Employers would do well to look to this matter; and amateurs, who only use a small solution in a tumbler, should not, as the custom sometimes is, keep it in their bed-rooms; the practice is decidedly dangerous."

CHINESE THERAPEUTICS.—The Chinese divide medicinal substances into heating, cooling, refreshing, and temperate. Their Materia Medica is contained in the work called the *Pen-taoscang-mou*, in 52 large volumes, with an atlas of plates. Most of our medicines are known to them and prescribed, also mineral waters, with which the country abounds. They also have animal magnetizers, called *Cong fou*.

They divide their prescriptions into seven categories, viz.: —1st, the Great Prescription; 2d, the Little Prescription; 3d, the Slow Prescription; 4th, Prompt, or Through-by-daylight Prescription; 5th, the Odd Prescription, for fools, madmen, hypochondriacs, and the hysterical; 6th, the Even Prescription, for the wise and good; 7th, the Double Prescription, for those in the family way.

Each of these recipes is applied to particular cases, and the ingredients that compose them are weighed out with the most scrupulous accuracy.

The physician never pays a second visit unless sent for, and sometimes his services are no longer needed.

A REMEDY FOR INSECTS IN PLANTS.—According to the *Gardener's Magazine*, hot water may be employed for the destruction of the insects that most commonly infest plants. Aphides quickly perish if immersed in water heated to 120 degrees Fah. We obtained from various sources plants infested with green fly, and cleansed them all by the simple process of dipping. It became desirable to ascertain the degree of heat the plants could endure in the dipping process. A number of herbaceous and soft-wooded plants were therefore subjected to the process of immersion. We found that fuchsias were unharmed at 140 degrees, but at 150 degrees the young leaves were slightly injured. Calceolarias suffered at 140 degrees, but the plants were not killed, though their soft tops perished. Pelargoniums were unhurt up to 150 degrees, but the slightest rise beyond that figure killed the soft wood and the young leaves completely.

Hill's Manure Spreader.

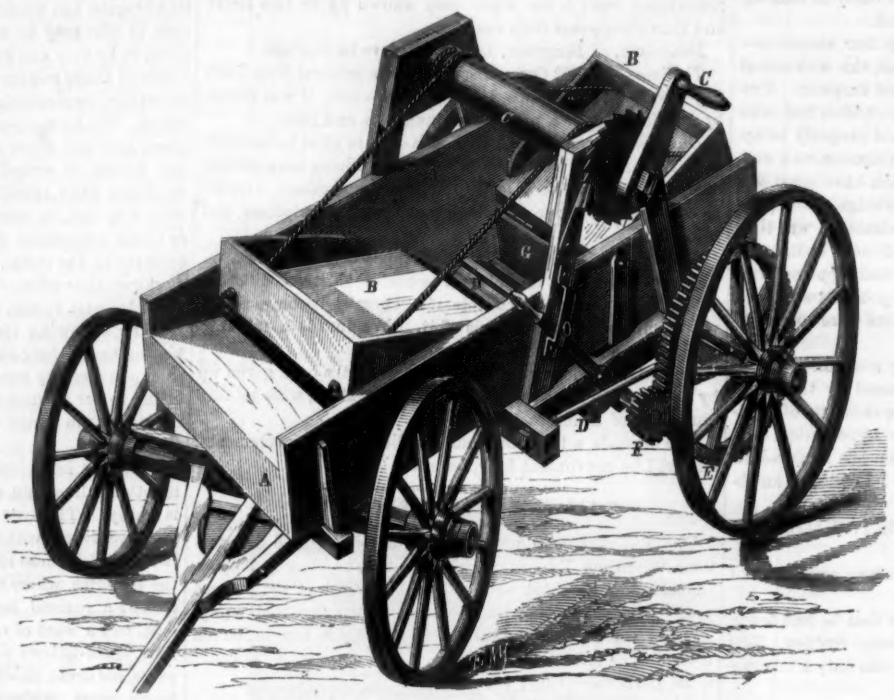
The manufacture and proper application of manure, and other fertilizers to soil, are matters of great moment to the agricultural interests of the country. Every farmer knows the great difficulty in applying well rotted manure of any kind evenly to the soil, as well as the heavy labor it entails when the work has to be done by hand, and the difficulty of spreading with any degree of regularity. The object of this invention is to do this work better, more rapidly, and without hand labor. It is simple in construction, easily managed, cheap and durable, and can be used on any ordinary farm wagon. In the engraving, A represents the frame or body of the machine, which may be placed upon any farm wagon or truck; or it may be placed on one axle if desired. If four wheels are used, the rear axle is rigidly attached to the frame, A, while the front axle is pivoted in the usual manner to admit turning.

The frame or box, A, has an open bottom; but for the usual bottom to a wagon box is substituted an adjustable hopper, B, made in two parts, as shown. This hopper consists of four leaves or plates, two for each portion working between the sides of the box or frame, A. The lower plates—of which one is shown at G—form the discharge end of the hopper, while the upper ones, B, receive the matter to be distributed. The leaf, G, is made adjustable toward or from a distributing cylinder, D, so as to regulate the rate of discharge.

The distributing cylinder, D, has longitudinal ribs; or if preferred may have rows of spikes or teeth to engage with the manure and haul it through the narrow opening at the bottom of the hopper next to the adjustable apron, G. This cylinder receives rotary motion from a gear and pinion, E and F, which are run out or into gear at pleasure by a lever. The upper parts of the hopper, lettered B, are thrown down to nearly a level position when the load is placed upon the truck, they being so pivoted that their own weight pulls them down when they are not inclined by the action of the windlass, C. This windlass is used to draw up the parts, B, so as to render them inclined planes down which the manure slides to meet the distributor, D, and as the load is gradually distributed the inclination is gradually increased, a ratchet wheel and pawl fixing the inclination until it is desired to change it. The connections between the windlass and the parts of the hopper, B, are pieces of rope, as shown.

We see nothing about this machine that is not eminently practical, and although we have not seen it in operation, we judge it will work in all respects as claimed for it, and that it is a valuable addition to the machinery of the plantation and the farm.

Patented through the Scientific American Patent Agency, by Daniel Hill, of New Vienna, Ohio, March 15, 1870. The entire right, or State rights, will be sold on reasonable terms. For further particulars address Daniel Hill, as above.



HILL'S MANURE SPREADER.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for the month of April, 1870:

During the month, 473 visits of inspection have been made, and 930 boilers examined, 726 externally and 335 internally; while 92 were tested by hydraulic pressure. The number of defects in all discovered, 474; of which 49 were regarded as as dangerous. The defects in detail are as follows:

Furnaces out of shape, 16; fractures in all, 25—9 dangerous; burned plates, 29—2 dangerous; blistered plates, 48—5 dangerous; cases of incrustation and scale, 110—4 dangerous; cases of external corrosion, 21—6 dangerous; cases of internal corrosion, 14—2 dangerous; internal grooving, 7; water gages out of order, 31—2 dangerous; blow-out apparatus out of order, 12—2 dangerous; safety valves overloaded 26—3 dangerous; pressure gages out of order, 92—6 dangerous; variations from—45 to + 23. Boilers without gages, 2—1 dangerous; cases of deficiency of water, 1; broken braces in 15 boilers—4 dangerous; loose braces in 12 boilers; new tubes ordered in 3 boilers; 1 boiler condemned as beyond repair.

Neglect to keep fire sheets clean, and urging fires too fiercely have shown their effects in distorting and fracturing furnace sheets. The tendency to overwork boilers cannot otherwise than produce such results. If boilers were supplied with accessible *hand holes*, and care taken to remove all deposit frequently, as well as working the fires moderately, our reports would be nearly free from cases of burned plates, fractures, and furnaces out of shape.

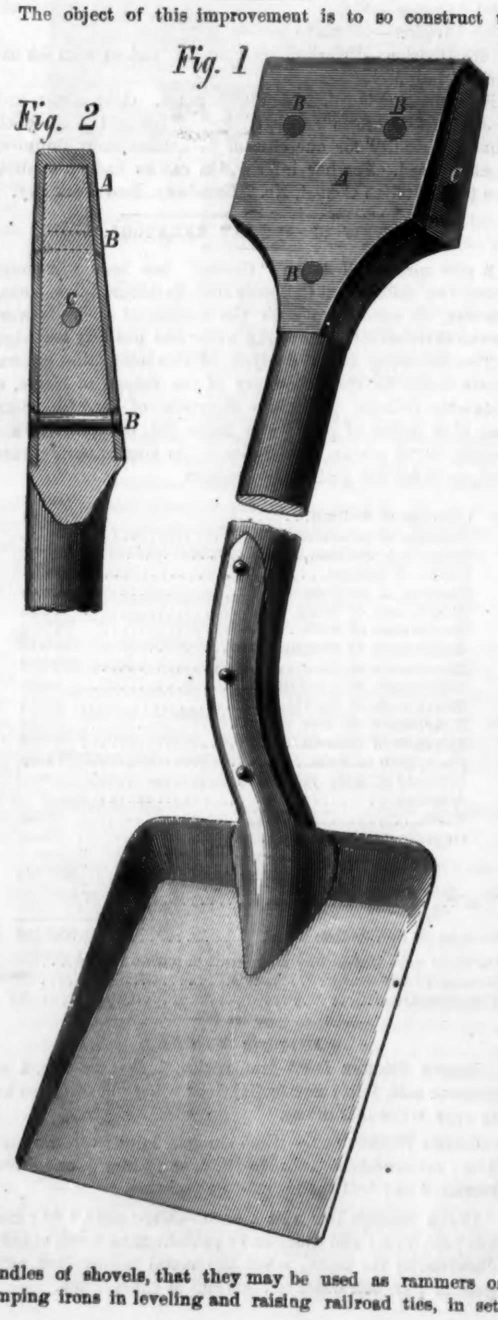
Much of the iron put into boilers is entirely unfit for use. We have recently examined a piece cut from a plate which was composed of no less than five distinct leaves or laminations. Such iron cannot otherwise than blister, and the whole structure will be weak and unsafe. Every sheet before being used should be most carefully examined with a view to detect flaws and weak places.

External corrosion arises from leakage at blow-out or leaky seams, especially around patches, the joints or fittings are not always tight and a little water between boiler and brick casing, in time, will do serious damage; hence, we not unfrequently find portions of sheets corroded so thin that a light blow of the hammer entirely penetrates the iron. Boilers set low down in damp places or subjected to the drippings of water from leaky joints in pipes, or from leaky tanks, are liable to this trouble.

We briefly call attention to the great number of inaccurate steam gages varying from—45 to + 23. It is all-important that these gages be often examined and tested, and engineers should see that they are. It is part of their duty to attend to such matters, and neglect to keep all important appliances in good condition should be evidence of inability.

IMPROVED SHOVEL HANDLE.

The object of this improvement is to so construct the



handles of shovels, that they may be used as rammers or tamping irons in leveling and raising railroad ties, in setting fence posts and telegraph poles, and for all other purposes where a rammer is needed in connection with a shovel.

The rammer, A, is formed on the end of a handle of a long-handled or dirt shovel. The side edges of the broad part of the rammer are covered with an iron plate made thicker upon, and near the end of, the rammer than in other portions, as shown in the sectional detail, and having its edges turned down over the beveled edges of the wooden part of the rammer as shown in the principal engraving.

This iron plate is secured to the wooden part of the rammer by the rivets, B, and the wood is prevented from splitting by transverse rivets, C.

This supplies a neat and convenient rammer without cumbering the workman with a separate tool.

Patented, April 12, 1870, through the Scientific American Patent Agency, by Geo. C. Choate, of Wyoming Station, Wyoming Territory, who may be addressed for the entire right or State rights, or rights to manufacture on royalty.

"What A Change was there, My Countrymen!"

William Cullen Bryant recently delivered an interesting discourse before the New York Historical Society on the life and character of the late Gulian C. Verplanck. Perhaps nothing serves to impress us so vividly with the change that has come over the face of this island in less than a century, as to read that Mr. Verplanck was born in Wall street, on the site of the present Assay Office, when all to the north of it was country, and then to reflect that he lived to see the population cover nearly all the available space between the two rivers, and spread across both; and to become the President of a Board of Emigration which passed at last over 250,000 immigrants in one year into the country.

Petroleum Gas as Fuel.

The largest boilers at the Erie water works are now heated solely by the flow of natural gas from the well recently sunk there. This well is down five hundred and ten feet, and has cost $1,500. The gas is conducted by an inch-and-a half pipe, without gasometer, through smaller pipes underneath the boilers. The flow has been steady, and less than one half the amount has been necessary, to keep up a pressure of forty-seven pounds of steam to the inch, the usual pressure required. No coal whatever has been used since its introduction, the cost it saves being from eight to ten dollars per day. Thus far it has only been conducted into the fire space under the boilers, but pipes will be put in to conduct it directly into the flues. Besides the saving of coal, the item of cleanliness is one worth taking into consideration. There is no smoke, no dust, no ashes, and nothing to do except turn a faucet to either shut off all heat or put on full force, in a twinkling. Added to the intrinsic value of this well, the success in finding gas has opened a new channel of prosperity, and several prospects and enterprises, wherein the cost of fuel is the great item of expense and whereby it may be made almost nominal, are already afoot, and doubtless some of them will be pushed through to a fair trial. There is a plan talked of, says the *Dispatch*—and by men who generally mean business—to bore for gas in the edge of the bay, and use it in the manufacture of iron, thus doing away with the enormous cost of coal. The scheme looks like a wild one, but may be more practicable than the majority would consider it. A couple of gas wells like that at the water works would certainly be a great assistant in saving coal.

Gases Evolved by Ripe Fruits.

According to Lechartier and Bellamy, picked fruits—such as apples, cherries, and gooseberries—at first absorb oxygen; afterwards they give off carbonic acid, and in larger volume than the previously absorbed oxygen. At first the evolution of gas takes place uniformly, afterwards it moderates, and then ceases for a time, and commences again and gives off more gas than during the first period. An increase of temperature promotes the transformation. Whether light has any influence upon the reaction is not stated. From these observations it will appear that it is unsafe to sleep in apartments where much fruit is stored.

Useful Household Recipes.

To Improve Starch.—To each bowl of starch, add one teaspoonful of Epsom salts, and dissolve in the usual way by boiling. Articles starched with this will be stiffer, and will be rendered to a certain degree fire-proof.

To Remove Stains from Linen.—To remove wine, fruit, or iron stains, wet the spot with a solution of hyposulphite of soda, and sprinkle some pulverized tartaric acid upon it; then wash out as usual. Strong vinegar can be used instead of the tartaric acid.

Moth Powder.—Lupulin (flour of hops), 1 dram; Scotch snuff, 2 oz.; gum camphor, 1 oz.; black pepper, 1 oz.; cedar sawdust, 4 oz. Mix thoroughly, and strew (or put in papers) among the furs or woolen to be protected.

Liquid for Cleaning Silver.—Add gradually 8 oz. of prepared chalk to a mixture of 2 oz. of spirits of turpentine, 1 oz. of alcohol, ½ oz. of spirits of camphor, and 2 drams of aqua ammonia. Apply with a soft sponge and allow it to dry before polishing.

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Contents:

(Illustrated articles are marked with an asterisk.)

DETERIORATION OF COAL BY EXPOSURE TO THE AIR.

Very few articles on this important subject have appeared in our scientific journals, and it is only within a few years that the attention of engineers has been called to the great loss suffered by coal from exposure in the open air. Recently a German chemist, Dr. E. Richters, has been studying the question, and has given the world the benefit of his observations. It appears that coal at ordinary temperatures, absorbs oxygen; and if it be heated to 390° F., it at first increases in weight, carbonic acid and water are expelled, and oxygen absorbed until the oxygen and hydrogen are in the proper proportions to form water.

The carbon in the coal appears to be present in two modifications, one of which is not well understood, and is comprised under the general name of bitumen. The bitumen carbon is first oxidized, and the other modification is the last to be affected. The amount of hygroscopic water that the coal can absorb varies considerably, and does not appear to be dependent upon the structure of the coal. Solid coal absorbs, not unfrequently, three times as much water as a softer, more lamellar article.

The changes that take place in the coal are naturally more rapid in the early stages of its exposure than at a later period, but the absorption of oxygen does not cease at any time. If a current of air is passing over a coal heap, large quantities of carbonic acid will be given off; but where the air is quiet, the coal absorbs the carbonic acid and less change is manifest. According to this, on windy days the loss in the weight of coal must be greater than when the weather is calm.

The temperature of the air has much to do with the deterioration of coal, as warm weather greatly promotes the absorption of oxygen and the formation of carbonic acid. All engineers agree that the influence of moisture is very great. Water operates in various ways; it acts upon the iron pyrites, that in greater or less quantity accompanies all coal, oxidizes the iron, slakes the coal, and thus exposes greater surface to the action of the air, and heats up the mass, so as to promote oxidation. The sulphate of iron in turn oxidizes, and is again reduced by the coal; and it is thought that the green vitriol thus serves as a conveyancer of oxygen to the coal, and occasions its combustion. This fact has been overlooked in accounting for the large loss in the value of coal.

Whether sunlight has any influence upon the decomposition and oxidation of coal is uncertain. All of the observations were contradictory, but perhaps a majority of them authorize the conclusion that sunlight prevents the destruction of coal.

The spontaneous combustion of coal is a matter of great importance, and has been the special object of study, but it is difficult to give a satisfactory explanation of it. By some observers it is attributed to a species of molding, such as moist hay undergoes, thus giving rise to sufficient heat to ignite the mass; others assign great influence to the decomposition of iron pyrites, but a closer study of the subject has shown that 160° Fah. is the utmost that can be anticipated from this cause.

The most rational explanation appears to be the absorption of oxygen and the rapid oxidation of the carbon—the more rapid the oxidation the greater the increase of heat, until a temperature is reached that sets fire to the heap of coal. The conditions that favor the spontaneous ignition of the coal are, great exposure of surface, fine structure of the coal, piling in large heaps, and moisture.

There appears to be no doubt that the loss in the weight and heat-producing value of coal is very great, whenever it is exposed to the action of the atmosphere in large heaps, and it is better not to keep such a stock on hand as is done by many establishments. Aside from the loss in weight, there is a manifest deterioration in its heating power, occasioned by the liberation of much of the hydrogen, and the consumption of the bitumen modification of carbon. Coal freshly mined is more valuable as a fuel, and it is worth more per tun than the heaps that have been deteriorated by long exposure to the air.

THE USE OF WIRE ROPE IN CIVIL AND MECHANICAL ENGINEERING.

A marked feature of present mechanical progress is the increasing use of wire rope in civil and mechanical engineering. The world probably owes a greater debt to the late John A. Roebling than to any other man connected with the introduction of wire cables as a constructive material. It was he who by his scientific employment of this material educated the public, at least the American public, up to the full appreciation of its value. From his labors and experiments the principal data upon which other engineers now depend in the use of wire for constructive purposes have been chiefly obtained.

Now we find wire rope employed in almost every engineering work. It constitutes an important part of modern ship rigging. It is used for hoisting, for towing boats, for bridges, for suspended tramways, for propulsion of cars up heavy grades, and even upon level surfaces. It is found to be the cheapest and most efficient medium for the transmission of power to long distances. Every year increases the number and extent of its applications.

Two of the most recent applications to which this material has been put are in our opinion destined to prove equal in importance to any which have preceded them. We allude to the transmission of motive power, and the tramway system invented by Mr. Hodgson of which several notices have recently appeared in these columns.

The telo-dynamic cable system, is, if we mistake not, destined to a most brilliant future. This country affords a notable field for its advantageous employment. Our mining districts are, many of them, so situated that power can only be obtained in this manner, or by the use of steam.

We do not entertain a doubt either that the wire rope tramway system will be found of vast benefit to our mineral districts. It is simple, practical, and cheap, and has demonstrated its value as a means of transporting ores and freights.

To what other uses wire rope may be destined it is impossible at present to say, but the success which has attended its applications thus far, encourages the belief that inventors and engineers may still find it a valuable resource for purposes not yet thought of and in ways hitherto undiscovered.

THE IMPACT OF BODIES.

The easy discussion of the laws of impact, and, we may add, their easy and complete comprehension, require the use of mathematics. The subject is, however, so important in mechanics, that we shall attempt, in the present article, to place its salient points before our readers, avoiding mathematical discussion, so that those not familiar with such discussions may understand, as well as the nature of the subject will allow, the phenomena of impact and its results.

In the first place, what is meant by impact? A common idea among those who have not paid special attention to this and cognate subjects, is, that bodies of matter may approach until their surfaces touch. But science teaches us, that howsoever much they appear to touch, they are never in absolute contact. When a nail is struck by a hammer, the hammer approaches within a very minute distance from the head of the nail, at which distance the nail instantly recedes, penetrating even the densest wood in its obedience to this law, that no atom of matter shall ever actually touch any other atom.

A body is, in this view, a series of atoms, each keeping its proper distance from all others, and only changing its distance at the near approach of other matter, or by motion derived from some external cause.

Science further teaches us, that neither these atoms, nor the molecules (little masses) which they assemble to form, are ever at rest, but that they are constantly moving within the spaces maintained about them, the various modes of motion which they possess giving rise to the phenomena of heat and its correlative forces.

It is now well established, also, that no motion is lost throughout the universe; that whatever is subtracted from one body is either added to that of some other body, as mass motion, or is added to the molecules, making up the masses themselves, or other masses, appearing as heat, etc., and that when heat, or other mode of molecular motion, or mass motion disappears, either some other form of molecular motion or mass motion commences, or, it may be, both mass motion and molecular motion in equivalent quantity, take the place of the seemingly lost motion.

Impact, we shall, therefore, define to be the arrival of one body to that point of approach toward another body, when the latter commences to move as a mass relatively to the striking body, or to undergo a change in the normal relations of distance between its molecules.

The books define impact to be the sudden blow caused by one body striking against another, either in motion or at rest; but this definition does not appear to express the true nature of impact, in accordance with the present state of the science of molecular physics.

Previous to impact, two bodies may both be moving in the same, or in opposite directions, or one may be (relatively to the other) at rest; or both may be approaching the point where the impact will take place, in lines forming some angle less than 180°, and they may have the same or different velocities. These are the conditions of motion under which all impact must take place.

The other conditions upon which the results of impact will depend, are the respective elasticities or inelasticities of the bodies, and their relative masses.

In examining these results, we find that the modern doctrine of the conversion of mass motion into molecular motion, and molecular motion into mass motion, renders clear much that was formerly mysterious. We must bear in mind, that all the results of impact may be classed, either as mass motion or molecular motion. When mass motion ceases, we shall always be able to detect a change of form or temperature, or other indication of increased molecular motion.

When elastic bodies suffer impact, we have a conversion of mass motion into molecular motion, and a reconversion of the latter into mass motion in directions dependent upon the angle of their approach. When inelastic bodies meet, a portion or the whole of the mass motion may be converted into molecular motion, and as, in this case, there can be no reconversion, as in the case of elastic bodies, the results of such impact will be a permanent change of form. But, as no body is without some elasticity, and as the results of impact increase with increased velocity, and *vice versa*, there may be a velocity from which the result of impact would be less than the limit of elasticity, and no permanent change would be produced.

The destructive effects of impact belong to the class of permanent results. It is now a well-established fact, that the destructive effect and the work a body will perform increase with the square of its velocity, all other things remaining equal.

If a spiral steel spring be placed upon a board and struck with a hammer, it does not penetrate the board to any great extent, whereas, a nail, struck with the same force, penetrates to a considerable depth. Here we have a destructive effect, —*i. e.*, the rupturing of the fibers of the wood,—varying greatly for the same amount of force applied, the difference being entirely in the character of the effect, not in the quantity, and depending upon the difference in the elasticities of the body struck.

The explanation of this is based upon the fact, that it takes time for motion to be communicated from molecule to molecule throughout a mass, and that, if the minimum limit of time, in which this can take place, be not allowed, the molecules are separated beyond their normal molecular distances, and rupture is the result. The intervention of an elastic body between two inelastic bodies, at the moment of impact, lengthens the time during which the motion of one is imparted to the other, so that this motion is transferred gradually, and the minimum limit of time required, for the motion to pass from molecule to molecule, is allowed.

Thus—suppose two cars, upon a railway track, were to approach each other at a velocity sufficient to destroy them without such a spring intervening, and suppose that they can only yield one fourth of an inch without breaking up, their motion would be converted into destructive effect (molecular change or motion), during the time consumed by their movement through the quarter of an inch. But if a spring were interposed, of sufficient strength, capable of yielding three inches, at which point it should still retain sufficient power to completely stop the approach of the cars, it is plain, that the time during which the motion will be transferred, has been greatly increased; and, instead of being converted into destructive effect, it will be converted into tension, or increased molecular motion, in the elastic spring, which will, in turn, be reconverted into mass motion, and the cars will be thrown apart again.

Motion, as a mass, can never be produced in a body by the impact of another body upon any portion of it, until the motion received is diffused throughout the entire mass; this requires time, and, if the velocity of the striking body is so great that this time is not allowed, destructive effect is always produced.

THE PROBLEM OF CITY TRANSIT.

We last week gave the views of Mr. A. T. Stewart, and of Mr. William A. Whitbeck, relative to the great question of transit in this city. These gentlemen expressed their views as to the financial and legal aspects of the question, as well as to the practical details of some of the plans proposed. We herewith give the views of a well-known practical engineer:

VIEWS OF MR. HAMILTON E. TOWLE—HIS GRAND VIADUCT PLAN FOR THE CITY OF NEW YORK.

Mr. Towle thinks it is proper to consider in the first place what general classification is possible—they resolve themselves into three general divisions: the first comprising those to be operated below the general surface or level of the streets; the second, those upon the level of the streets; and the third, those that are elevated and operated above the line of the streets.

Without entering into any detailed recital of the considerations of the objections to the first division, involving a study of the geological structure of the island, the construction of existing sewers, positions of gas and water pipes, and of the relative relations of the streets above—he thinks it will be

sufficient to state that the objections are so serious in the several comparisons, that plans in this division are considered by him to such an extent impracticable, as not to be recommended.

Respecting the second division, which at once brings ordinary local traffic into conflict with any quick and powerful means which must be operated upon its own time tables and rules, the very idea of continued conflict, independent of many other serious objections, also condemns this method.

In considering the third division, including all elevated ways, which are entirely independent of the foregoing objections to both of the other systems, which to certain serious extents hold good in every special plan included under either the first or second division, he thinks we should leave out of view for the moment all other things, and examine what are the requirements of such a means of transit as we wish to find.

Primarily they are, ample capacity, great rapidity, and convenience, with complete safety; and, secondarily, they are, permanence of construction with reasonable cost of permanent way, and economical maintenance and operation of the line when completed, to yield a fair interest on the capital invested.

He believes all these requirements can be better reached through the medium of a magnificent Viaduct stretching from one end of the city to the other, above the general street line, than by any other system.

Such a Viaduct would occupy a strip fifty to sixty feet in width through the middle part of the blocks, and carry eight lines of rails, forming four complete railroad tracks of ordinary (4 feet 8½ inches) gage, all upon the same level.

In general there would be three continuous iron girders forming the center and side longitudinal supports of the cross beams, which will, in turn, receive the stringers carrying the tracks.

A popular and brief description of the structure would be conveyed by saying that it would be a long, well-designed bridge, resting upon short, inexpensive piers, built upon a perfectly reliable foundation, and wide enough to carry four tracks between the side girders of the bridge, with two sidewalks for passengers outside of the outer girders.

The tracks would be operated in pairs. One pair of them devoted to trains for local passenger traffic—stations, say, about four blocks apart—running all day and all night; the other pair of tracks for very rapid passenger traffic during the busy hours of the twenty-four; while during the remainder of the day and night one pair of tracks would be employed for distributing and collecting incoming and outgoing freight for the various railroad lines running out of the city with which the Viaduct should be connected.

Valuable stores would principally occupy the various fronts below the level of the Viaduct, and the present rears of lots or back-yard spaces, directly under the Viaduct, would be more useful and valuable as continuations of such stores or as warehouses for the storage of freight let down from above, than for present uses. Accessible drive-ways would be provided at the side of the fronts for teams to pass in; they would uniformly pass out on the other street. The rental of these spaces or stores would contribute materially to the interest fund on capital invested.

The Viaduct itself would be supported entirely upon its own sub-foundation, and the occupants of buildings on either side would consequently, with other proper precautions in construction, be so slightly inconvenienced as to disregard the practical working of the lines.

The provisions for receiving and sending off freight, from stations located at convenient points, and the handling of the same, are among the many important details of practical engineering, which cannot well be explained here.

This is but a brief general explanation of this Viaduct project, which will, he thinks, be found to be sufficiently comprehensive in its scope to answer all the requirements of a main, central, Grand Viaduct through the central part of the island, and is one perfectly simple and comprehensible. Moreover, he thinks it would prove an ornament to the city and shed lasting fame on the public benefactors who will sooner or later erect, and reap a handsome reward for creating and realizing the Grand Viaduct of the City of New York.

VIEWS OF WM. R. MARTIN.

This gentleman, who is largely interested in real estate, and in the growth and prosperity of the city, favored us with his views at length. His name will be recognized by many as that of one who has given long and patient attention to this question, and whose opinions are of great value in its general consideration.

He thinks the solution of the problem of city transit is to be reached by considering the geographical form and situation of the island, the points of access to and departure from it, its natural thoroughfares, and the daily migrations of its inhabitants; and that it is quite possible to find a solution that will include all that is valuable in the various plans and diverse routes that have been presented to the public attention.

The island is long and narrow: its lower section is occupied by business, and its central and upper sections by residences. Beyond the built-up portions of the island, to the north, are vacant areas, which furnish the best natural advantages for the future sites of fine residence sections, and broad business sections of the metropolis. These sections, the most valuable in the vicinity of the city, are unoccupied, because they remain inaccessible. Means of rapid transit to every part of the suburbs of New York in every direction, for thirty miles, are multiplying as fast as the population demands them. The upper portion of the island alone remains inaccessible, and it is now practically more than thirty miles from the business sections of the city.

The owners of this property are nevertheless taxed as a part of the city, and the property, thus unjustly neglected, pays in taxes (without any reciprocal benefit), every year, enough to build a steam railroad. It is the first consideration of a system of steam transit. That the road should run the whole length of the island. This property then would be filled with population, and trade and value in every portion greatly benefited.

The lower miles' length of the island is its great location for heavy business, and the principal point of access and departure for foreign travel, for travel from Long and Staten Islands, and for travel south and southwest. This travel approaches now by ferries, striking the shore from Chambers street on the North river, round by the Battery, to Catharine street on the East river. It will, before long, have the additional avenues of approach furnished by the East River Bridge from Brooklyn, the tunnel from Jersey City, and the railroad across the Bay from Staten Island.

The city is also approached on the north by railroads, from the east, north, and west, coming in by the Fourth avenue to Forty-second street, and by the Twelfth and Eleventh avenues to Thirtieth street. Steamers from the East, and foreign steamers, will, in the future, land passengers along the East and Harlem river shore; and more frequent ferries and steamboat lines on the North river will bring passengers to the North river shore.

Travelers thus approaching and departing from the city need to be accommodated by inter-mural transit, so as to reach the centers of business and the residence sections; and also, so as to reach opposite and different points of departure. This is the second consideration of a system of steam transit.

The island now is occupied by business at its lower section; the Park may now be regarded as its center, and in the future, the business center may advance upwards along the line of Broadway.

The residence section lies now principally between Fourth and Sixth avenues, from Fourteenth street to the Central Park, for the residences which cost the most; with well defined sections, east of the Fourth avenue and west of the Sixth avenue, for the residences which cost less, and which accommodate more than one family in a single house. Further northward, abreast of the Central Park, the division of the residence sections into the East side and the West side is more distinctly marked. From these several residence sections to the down-town business sections is the daily migration of the inhabitants, and these are the natural lines of travel. If the main thoroughfares were opened on these natural lines there would be, in addition to Broadway for the central thoroughfare, one for East side travel, by continuing Third avenue southerly from Fourth street to the head of Center street, at Broome street; and the other, for the West side travel, by continuing Sixth avenue from Carmine street to the head of West Broadway, at Canal street. This is the third consideration for a system of steam transit.

Now in a comprehensive system there are three central points to be regarded as fixed—1st, The Park; 2d, the Battery; and 3d, the Railroad Depot at Fourth avenue and Forty-second street.

The Park is now the down-town terminus of all the city surface railroads. It will be the landing place of the Brooklyn bridge, and will be the best place for the debouchment of the tunnel to Jersey City when one shall be made. The space in front of the Astor House is too crowded. That between the City Hall and the Post Office is to be the future down-town center for city transit, surface and underground. A sufficient area underground would be excavated and vaulted over, to which passengers could arrive by tunnel from Jersey City, and perhaps from Brooklyn, and thence communicate with all the underground roads that might be constructed. Over this, under a sufficient colonnaded canopy, might be the station for all the surface roads, and for the road over the Brooklyn bridge; and by ample staircases, all these modes of communication from every direction would be in close contact. Mr. Mould, the Architect in Chief of the Department of Public Parks, has a well elaborated plan for combining this utilitarian use with the ornamentation of the Park. From this point, an underground road should pass down Broadway to the Battery, and up Broadway and the Bloomingdale Boulevard to Manhattanville, with a branch, diverging at Union Square, and passing up Madison avenue to Harlem river, passing the Union Depot at Forty-second street.

Around the river border of the city, there should be an elevated road, in connection with such new system of wharves and docks as may be adopted, extending the whole length and circuit of the island. These roads should be elevated above the street level, and should be reached by staircases from every ferry house, pier, and steamboat landing.

There should also be a means of rapid transit along the line of Greenwich street to the Ninth avenue, as a line midway between the North river and Broadway; and another along the line of Third avenue and Center street, Nassau and Broad street, each extending southerly to the Battery. These should be either underground or elevated roads. The most economical and serviceable plans would be elevated roads, running upon tracks supported by columns and girders, over and across the carriage way, and propelled by endless ropes.

A cross road from river to river should be made at Forty-second street, connecting with the new Union Depot at Fourth avenue, at Twenty-third street, and perhaps at other points. But as these distances are short, surface roads might, at present, answer the needs of travel.

Upon this comprehensive system of routes, thus generally indicated, accommodation would be afforded for suburban and city travel. A person who arrived at the city by ferry or steamboat, and wished to depart by any other ferry or steamboat, would find a river border road going directly there. If he wished to go to the Hudson River or Harlem Railroad depot, or to seek an hotel or a private residence, he could go to the Battery, where he would find the starting point of a road leading up Greenwich street and the Ninth avenue, of another leading up Broadway, and of a third leading up Center street and the Third avenue. This would take him within one-fourth of a mile of any point on the island, except the section east of the Bowery, that he wished to reach. Passengers arriving in the city at the Fourth avenue and Forty-second street could go at once to the Central depot at the Park, or to the Battery, and thence to their destinations, if down town; or, by taking the cross roads at Forty-second street, intersect any of the five main longitudinal lines of which mention has been made. At the various intersections proper connections should be made between the underground, elevated, and surface roads, and a great advantage would result from a direct elevated or underground communication, from the Park to the Fulton ferry on the East river side, and to the Jersey City ferry on the North river side.

This system of routes would comprehend the needs of city travel from the residence sections to the business portion of the city.

As to the various plans, the underground is the best for Broadway; for the other avenues on either side, the elevated is preferable, on the ground that it is less expensive and more comfortable. If a viaduct is used anywhere, it might be used on a line near Broadway, in place of an underground under Broadway. It would be needlessly expensive for a side route. But as between a viaduct near Broadway and an underground in it, the controversy has a strange attitude. The very men who would be most benefited by the underground, are opposing it, and advocating the plan that would be the greatest injury to them, the viaduct.

These men do not yet understand that the reason why Broadway has made them millionaires, and thus of consequence, is that travel, the best travel, is concentrated on it; and that their true policy is to concentrate it there, and not to allow it to be diverted; to hold on to it and give it every possible facility and increase of accommodation. Their conduct is just as sensible as if, on a proposition to lay additional tracks, the owners of the land along the New York Central, from Albany to Buffalo, should insist that the additional tracks should be laid twenty miles off, on one side, from the present track.

These property owners on Broadway are able to see that they might be incommoded temporarily in the occupation of their property; but they cannot see a step beyond, and discern the incalculable benefits that would accrue to them if Broadway should become the channel of the travel of a continent, and the greatest thoroughfare of money-spending people in the whole world. They can see that, so far, this is the present measure of the value of their property; and now that the street is crowded to its capacity, they set themselves to work to prevent any increase of its capacity and of its travel.

The best plan for the construction of a road on Broadway would be to excavate under the carriage way, between the curb stones, and to lay four tracks. If this were done to-day, there is not a merchant who would not, at his own expense, excavate his own vault and connect it with the road, merely for the sake of saving the expense of cartage, and of sending his goods to the railroad and steamboat.

If the viaduct plan near Broadway were adopted, as the Central route, it would take travel away from Broadway, and build up a parallel rival to it, and thus destroy the supremacy on this island which Broadway holds, and which it cannot lose unless it blindly sells itself out. This is the great argument in favor of the viaduct plan.

The Government at Albany has treated the city very harshly on this subject, and has rejected applications for authority to construct these roads, on insufficient grounds and for very crude reasons. But two plans have met their approval: One, the central underground, which has made no progress, and will not, unless they can build under Broadway; for they know that so expensive a road will not pay unless they have the best route. The second is the Greenwich street elevated road. This has been restricted by narrow public prejudice to a single row of columns to support the track. Leave should at once be given them to erect columns on each side the street, and to throw girders across for the support of their tracks. But Mr. Harvey is indefatigable, and has nineteen chances out of twenty in favor of his success: and if he succeeds, that plan, with such a modification as above suggested, will be very popular. Five miles of it can be built for the cost of a single mile of underground, and it will be very profitable.

The true test of city transit is not found in the wisdom of the Legislature. It is found in Capital. Any plan must call for money to build it, and it is here that it is scrutinized, and its engineering problems practically determined. The true way to do would be frame a comprehensive plan, and then authorize such companies as could show the capital to build the different lines. There would be need of all the capital that could come forward. Every one would have a chance to invest, practical questions would be solved, and the roads would be built.

But as yet all is disappointment and delay. This island is being depleted of its population. New Jersey and Long and Staten Islands are being built up. Capital and population are transported there. Strong property interests are accumulating in opposition to any movement for rapid steam transit northward to the Central Park. These men will oppose the plan which is uppermost in public support, and favor a rival plan, only to denounce that if it turns up. The bulk of transactions in the New York real estate market are of property off the island. There is more New York active capital employed in improving land and building houses in the

suburbs than on the island. The stage lines and the surface railroads are adverse to steam transit: many citizens live down-town, or midway up-town, and take no interest in more rapid transit. Property owners on any of the proposed lines take narrow views, oppose everything that may injure them to-day to benefit them a hundred-fold to-morrow, and have no regard for the general advance and prosperity of the city. Capital turns to the suburbs off the island to escape city taxation, and launches out into wild and speculative projects. Many of them contain the essential elements of failure, and when these appear, these capitalists will, for their own safety, gather together all the elements of opposition to rapid city transit, and fight desperately to prevent the growth of the city, and its population, on the splendid regions about the Central Park. Consider the advantages that Staten Island will present, when its beautiful shores and splendid hights are, by their railroad bridge, brought nearer in time to the City Hall than Murray Hill.

No man cares for New York; no man who has power. The city authorities, who have great power, do not see how the citizens are investing their property off the island to escape their taxation; and that this taxation falls with double weight on those who keep their property here, and who thus pay for themselves, and for their neighbors who take their property away. And still they go on, year by year, increasing the taxation. They do not consider the relation of this question of city transit to the natural growth of the city, in wealth and population, and how it is being depleted. This is too abstruse, as if it were some question about the obliquity of the ecliptic. In this respect, they have not been equal to Madison avenue. More time was taken to grade two miles of this avenue, free from rock, from Forty-second to Eighty-sixth streets, than was taken to grade the Pacific Railroad from the Missouri to the Sacramento; and after it is graded, they allow the Railroad Company two years to lay two miles of track, while thousands of people along that line have no means of transit, and must walk.

PATENT OFFICE AFFAIRS.

The business of the Patent Office is now in a flourishing condition, and the present is a favorable time to enter applications. Inventors will find the SCIENTIFIC AMERICAN PATENT AGENCY ready to attend to the prosecution of claims with the greatest dispatch. By reference to our register, we find that we have made upwards of twenty-four thousand preliminary examinations into the novelty of alleged new inventions. This great experience, together with the fact that a large proportion of all the business with the Patent Office, for the past twenty years, has been conducted through this Agency, suggests to inventors the surest and best means to secure their rights.

We give opinions free, and all we require is a rough sketch and description of the invention.

Inventions patented through this Agency receive notice in the SCIENTIFIC AMERICAN.

MODELS.—In order to apply for a patent the law requires that a model shall be furnished, not over a foot in any of its dimensions, neatly and substantially made. Send the model by express, prepaid, addressed to Munn & Co., 37 Park Row, New York, together with a description of the operation and merits of the invention.

CAVEATS.—Whenever an inventor is engaged in working out a new improvement, and is fearful that some other party may anticipate him in applying for a patent, it is desirable, under such circumstances, to file a caveat, which is good for one year, and, during that time, will operate to prevent the issue of a patent to other parties for the same invention. The nature of a caveat is fully explained in our pamphlet, which we mail free of charge.

EUROPEAN PATENTS.—Probably three-fourths of all the patents taken by American citizens in Europe have been secured through the SCIENTIFIC AMERICAN PATENT AGENCY. Inventors should be careful to put their cases in the hands of responsible agents, as in England, for example, the first introducer can take the patent, and the rightful inventor has no remedy. We have recently issued a new edition of our Synopsis of European Patent Laws.

All communications and inquiries addressed to Munn & Co., respecting patent business, are considered as strictly confidential.

Telegraphic Improvement.

The *Telegrapher* describes a valuable improvement in relay magnets, by W. W. Smith, of Cincinnati, Ohio. The improvement consists in arranging the connections of a relay so that the main circuit is divided, one half passing through each helix, and uniting again on the opposite side, instead of having the conducting wire of the two spools continuous, as in the usual manner. It will be seen upon a moment's reflection, that, by changing the connections of a magnet of the usual form, and arranging them upon Mr. Smith's plan, that the total resistance will be reduced one-fourth of the original amount, while the two helices will exert their magnetic influence in conjunction upon the soft iron cores, as usual.

BEET ROOT SUGAR IN THE UNITED STATES.

As our readers are well aware, we have always had faith in the ultimate success of the beet sugar industry in this country, and although our views have been characterized as sanguine, the press at large will credit us with having done more to foster this manufacture than almost any other journal.

We have not merely contented ourselves with statistics which go to demonstrate the possible profits of well-conducted beet sugar manufacturing, and the general good which would arise from its extensive introduction, but have also been at the expense of publishing a copiously illustrated series of articles upon the subject, so accurate and comprehensive that they were solicited for republication, and the engravings were purchased by Dr. Crookes, the editor of the *Chemical News*, London—than which no periodical published in the English language, ranks higher as a scientific exponent of its peculiar department.

We are happy to say, that although the progress of beet root sugar manufacturing in the United States is slow, still some advance has been secured by our efforts, and the articles we have published have been the means of stimulating inquiry and diffusing a great deal of useful and practical information—as well as interesting those, who, from want of correct information, had been accustomed to regard the subject with indifference.

Could the large area of territory adapted to this industry be aroused to active engagement in it, it would enormously increase the wealth of the country. At present seven eighths of the sugar consumed here is of foreign production. In France, Germany, and Belgium, native production supplies the entire demand.

How American stands in the scale of sugar-producing countries will be seen from the report of M. B. Dureau, the editor of the *Journal des Fabricants de Sucre*, upon the state of the sugar industry, made as one of the jury reports of the late Paris Exposition, and which we find in the American Supplement of the *Chemical News*:

TOTAL PRODUCTION OF SUGAR IN 1867.

COUNTRIES.	Kilo-grammes.	Pounds.	Per cent.
Cuba (exportation)		1,168,448,000	22·72
Porto Rico (exportation)		132,277,200	2·57
Antilles, English, Dutch Guiana		551,155,000	10·72
French Colonies		330,69 ,000	6·43
Louisiana		66,138,000	1·28
Mexico		70,547,840	1·37
Peru (exportation)		2,204,620	0·04
Brazil		286,600,600	5·57
Sandwich Islands		22,046,200	0·42
Spain		12,345,872	0·24
Port Natal		13,227,720	0·25
Queensland		1,102,310	0·02
China		31,305,004	0·61
Penang (exportation)		6,613,860	0·12
Siam		11,464,024	0·22
Java		286,600,600	5·37
East Indies (exportation)		52,909,880	1·08
Mauritius		220,462,000	4·29
Manilla (exportation)		132,277,200	2·57
Egypt (exportation)		22,046,200	0·43
Cane sugar		3,420,467,980	66·47
Beet sugar, Europe		1,433,003,000	27·87
Palm or date sugar		220,462,000	4·29
Maple sugar, North America		66,138,000	1·28
Total sugar		5,140,071,580	100·00
Sorghum sirup (gallons	18,000,000		

Although these figures are for 1867, the proportion cannot have altered much since, except that the cane sugar produced in Louisiana has increased somewhat.

The value of the annual consumption of sugar of all kinds in this country does not fall short of $75,000,000, about seven eighths of which, or nearly $66,000,000, flow out of the country, and we think might, and if so ought to be retained in it.

The proportion which beet sugar bears to the total production of all kinds will be seen from the following:

TOTAL PRODUCTION OF BEET SUGAR IN 1866.

COUNTRIES.	Kil-grammes.	Pounds.	Per cent.
France	216,850,000	478,071,847	32·14
Zollverein	192,500,000	424,389,350	28·53
Russia	100,000,000	220,462,000	14·83
Austria	100,000,000	220,462,000	14·83
Belgium	40,000,000	88,184,800	5·92
Poland	19,000,000	41,887,780	2·81
Holland	6,000,000	18,227,720	0·89
	674,350,000	1,486,085,497	100·00

The lesson which these figures teach cannot be strengthened by any comments of ours.

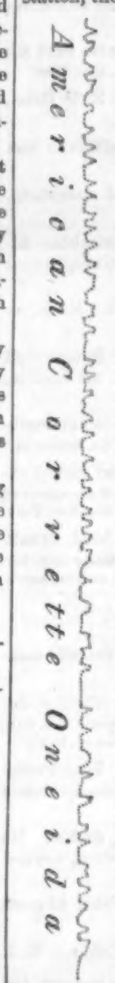
In Illinois, Wisconsin, and California, the production of beet sugar has commenced, with results highly encouraging, when we take into account the difficulties in establishing any new industry.

One of the difficulties hitherto experienced has been the necessity of importing the necessary machinery and outfit from Europe. We are glad to learn from the *Bureau*, a Chicago monthly, that this need no longer be the case, as a Philadelphia firm is now prepared to fill orders for this class of machinery. This begins to look like work. A little more experience of the fact that the beet sugar business pays will set the tide of capital in the direction of this industry, and it will become a permanent occupation on this continent.

Novel Telegraphy—Electrification of an Island.

Fleeming Jenkins communicates to *Nature* a curious discovery made by Mr. Gott, the superintendent of the French company's telegraph station at the little island of St. Pierre Miquelon. There are two telegraph stations on the island. One, worked in connection with the Anglo-American company's lines by an American company, receives messages from Newfoundland and sends them on to Sydney, using for the latter purpose a powerful battery and the ordinary Morse signals.

The second station is worked by the French Transatlantic Company, and is furnished with exceedingly delicate receiving instruments, the invention of Sir William Thomson, and used to receive messages from Brest and Duxbury. These very sensitive instruments were found to be seriously affected by earth-currents; *i. e.*, currents depending on some rapid changes in the electrical condition of the island; these numerous changes caused currents to flow in and out of the French company's cables, interfering very much with the currents indicating true signals. This phenomenon is not an uncommon one, and the inconvenience was removed by laying aa insulated wire about three miles long back from the station to the sea, in which a large metal plate was immersed; this plate is used in practice as the earth of the St. Pierre station, the changes in the electrical condition or potential of the sea being small and slow, in comparison with those of the dry rocky soil of St. Pierre. After this had been done, it was found that part of the so-called earth-currents had been due to the signals sent by the American company into their own lines, for when the delicate receiving instrument was placed between the earth at the French station and the earth at the sea, so as to be in circuit with the three miles of insulated wire, the messages sent by the rival company were clearly indicated, so clearly indeed, that they have been automatically recorded by Sir William Thomson's siphon recorder. Annexed is a *fac simile* of a small part of the message concerning the loss of the steamship *Oneida*, stolen in this manner.



It must be clearly understood that the American lines come nowhere into contact, or even into the neighborhood of the French line. The two stations are several hundred yards apart, and yet messages sent at one station are distinctly read at the other station; the only connection between the two being through the earth; and it is quite clear that they would be so received and read at fifty stations in the neighborhood all at once. The explanation is obvious enough: the potential of the ground in the neighborhood of the stations is alternately raised and lowered by the powerful battery used to send the American signals. The potential of the sea at the other end of the short insulated line remains almost, if not wholly unaffected by these, and thus the island acts like a sort of great Leyden jar, continually charged by the American battery, and discharged in part through the short insulated French line. Each time the American operator depresses his sending key, he not only sends a current through his lines, but electrifies the whole island, and this electrification is detected and recorded by the rival company's instruments.

No similar experiments could be made in the neighborhood of a station from which many simultaneous signals were being sent; but it is perfectly clear that unless special precautions are taken at isolated stations, an inquisitive neighbor owning a short insulated wire might steal all messages without making any connection between his instrument and the cable or land line. Stealing messages by attaching an instrument to the line was a familiar incident in the American war; but now messages may be stolen with perfect secrecy by persons who nowhere come within a quarter of a mile of the line. Luckily, the remedy is simple enough.

All owners of important isolated stations should use earth-plates at sea, and at sea only. This plan was devised by Mr. C. Varley many years ago to eliminate what we may term natural earth-currents, and now it should be used to avoid the production of artificial earth-currents which may be improperly made use of.

BRICKS FROM GAS COAL ASHES.—According to the *Gaslight Journal*, walls of remarkable lightness, porosity, and dryness may be built cheaply of bricks made from the ashes of the coke derived from gas-works. Mr. Wagner, the first inventor of the process for effecting this, instructs us as follows as to his *modus operandi*: "The ashes, after being taken from the retorts, are spread on the surface of a clean floor; they are then finely pulverized, and 10 per cent of slacked time, together with a small proportion of water, is intimately stirred and incorporated with them. After a rest of twenty-four hours, the mixture is made into bricks by the ordinary process. These bricks are immediately transferred to the drying sheds, where a few days' exposure renders them fit for use."

IT is a well-known fact in surgery that when air gets into the tissues in consequence of a perforation of the lung by a punctured rib, it does not excite putrefaction or suppuration as it is apt to do, when it acts on an external wound. Professor Tyndall, in a letter to the *Times*, connects with this fact his observation, by means of a beam of light, that air expelled from the lungs by a forced expiration contains no floating particles, and considers that together these facts afford a complete demonstration that germs in the air removable by filtration are the cause of putrefaction and its associated phenomena of animalcular life.

APPLICATIONS FOR EXTENSION OF PATENTS.

MACHINE FOR SWEEPING GUTTERS.—William H. King, Philadelphia, Pa., has applied for an extension of the above patent. Day of hearing Aug. 3, 1870.

PROCESS OF PREPARING LINSEED, ETC., FOR PRESSING, IN EXTRACTING OIL.—Charles Moore, Trenton, N. J., has petitioned for an extension of the above patent. Day of hearing Aug. 3, 1870.

REDUCING WOOD FIBER TO PAPER PULP.—Henry Voelter, Heidenheim Kingdom of Wurtemburg, Germany, has petitioned for an extension of the above patent. Day of hearing August 10, 1870.

The Universal Wringer has been in use in our family for years, giving entire satisfaction. We speak whereof we know when we say it is one of the best labor-saving machines ever invented, having several points of superiority over any Wringer we have examined.—[New York Liberal Christian, April 2, 1870.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Pictures for the Sitting Room.—Prang's latest Chromos, "Flowers of Hope," and "Flowers of Memory." Sold in all Art and Book Stores throughout the world.

Keane's Silver-plating Compound plates metals with pure silver instantaneously. Keane, Silver Plater, 75 Bleecker st., New York.

Proprietors of Soapstone Quarries send address to E. D. Rand, Burlington, Iowa.

Cheese-box and Salt-box Manufacturers send address to Box 51, Stroudsburg, Monroe Co., Pa.

Tempered Steel Spiral Springs for machinists and manufacturers. John Chatillon, 91 and 93 Cliff st., New York.

Adjuster Wanted.—We want first-class sewing-machine adjusters. For further particulars apply or address Wilson Sewing Machine Co., Cleveland, Ohio.

Watchmaking and Photographing, at Three Oaks, Mich., on M. C. R. R. Price of business and building, $2000.

Shop, Town, County, or State Rights for sale, for Patent Coal Scuttle. For circular, etc., address T. T. Markland, Jr., 1515 South st., Philadelphia, Pa.

Rawhide Sash Cord has no equal for heavy windows or dumbwaiters. Makes the very best round belting. Darrow M'f'g Co., Bristol, Ct."

Galvanized iron ventilating skylights, straight and curved extension lights, conservatories, etc., under patents dated 1869–70, are approved by every architect. For Rights address Geo. Hayes, 75 8th ave., New York.

Crampton's Imperial Laundry Soap, washes in hard or salt water, removes paint, tar, and grease spots, and, containing a large percentage of vegetable oil, is as agreeable as Castile soap for washing hands. "Grocers keep it." Office 84 Front st., New York.

Komp Eyeletting Machine. See advertisement.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the United Co., 17 Warren st., New York.

One 60-Horse Locomotive Boiler, used 5 mos., $1,200. Machinery from two 500-ton propellers, and two Martin boilers, very low. Wm. D. Andrews & Bro., 414 Water st., New York.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

Stiff, heavy, powerful lathes, planers, shapers, slotters, and radial drills, in stock. E. & A. Betts, Wilmington, Del.

Second-hand donkey pumps, 12, 25, and 35-H. engines, leather hose, old style blowers, cocks, valves, etc., etc. Wm. D. Andrews & Bro., 414 Water st., New York.

Steel Makers' Materials—Wolfram ore, oxide manganese, Speigel iron, borax, titanium, chrome, lubricating black lead, for sale by L. & J. W. Feuchtwanger, 55 Cedar st., New York.

Revolving Head-screw Machines, Gang Drills, Lathes, Tapping, milling, profiling, and other machines for sewing machine works, with latest improvements and excellent workmanship, constantly on hand or finishing, by the Pratt & Whitney Co., Hartford, Conn.

An experienced mechanical and railway engineer wishes a position as Master of Machinery, or Manager. Address "Engineer," Station "G," Philadelphia, Pa., Postoffice.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y.

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

W. S. W., of Mass.—The information you desire would occupy too much space for this column. We advise you to consult the Painter, Gilder, and Varnisher's Companion, published by Henry Carey Baird, 406 Walnut street, Philadelphia.

J. C., of Ind.—To make paper hangings stick well to a wall that has been whitewashed, scrape the whitewash off thoroughly, and give the wall a coat of glue size before putting on the paper.

C. E. M.—We know of no water-proofing that we think would be practicable for fish-lines. We think a twisted linen line better than a braided one.

W. H. C., of Ill.—The number of strokes and diameters of cylinders upon two steam engines being equal, and the pressure of steam and other circumstances of working precisely similar, the greater power will be developed in the longer cylinder.

W. K. B., of Ind.—The attraction of U-shaped electro-magnets, with an equal number of windings, is proportional to the squares of the magnetizing current force, or intensity. With equal currents it is proportional to the square of the number of windings of the magnetizing spirals. It is proportional to the square of the current force multiplied by the square of the number of windings. [This is true alike for attraction and sustaining force, both in straight and in U-magnets.] The magnetism of massive cylinders of iron of equal length, magnetized by Voltaic currents of equal force, and by spirals of an equal number of windings, closely surrounding the core, is accurately proportional to the square roots of the diameters of these cylinders. For the particular case in which the surface of contact does not disturb the result, the attraction and sustaining force are, with equal magnetizing forces, proportional to the diameters of the bar or U-magnets. The attraction of bar and U-shaped electro-magnets with equal magnetizing forces, increases the nearer the whole of the windings are to the poles. The attraction, like the sustaining force of U electro-magnets—other things being equal—remains the same, whatever be the distance of the branches of the magnet. The length of the branches of a U-shaped electro-magnet has no influence on its attractive or sustaining force, if the windings of the spiral surround its whole length. The attraction which a helix or spiral exerts upon a soft iron bar placed in its axis, follows the same law as an electro-magnet; hence it follows, that: The attraction of a spiral is proportional to the square of the magnetizing current, multiplied by the square of the number of windings. The sustaining power of the electro-magnet increases with the mass of the armature up to a certain point, not exceeding the mass of the electro-magnet itself; and, moreover, Liais has shown that an armature whose face of contact is not over one third the breadth of the poles to which it is applied, gives a maximum effect. The intensity of the current increases with the number of cells. A reliable description of Leclanche's battery appeared in No. 7, current volume.

G. H. W., of N. Y.—The collapse of your kitchen boiler was undoubtedly owing to the sudden escape of steam and sudden condensation from influx of cold water, when the faucet was opened; the water being probably nearly all driven out of the boiler by the pressure of the steam. We had a boiler collapsed in the same way a few days since, by the carelessness of a servant. A valve opening inwards, at the top of the boiler, will prevent any such accident.

M. T., of Pa.—The side-thrust and dragging of wheels on locomotives and railway cars in passing curves, are mostly obviated by the conical form of the tread of the wheels, so that the wheels on the outer part of the curved track bear on a larger circumference than the inner ones.

J. F., of Pa.—Were there no resistance of the air, a ball fired vertically from a gun would return to the muzzle with exactly the force it left it in its ascent. As it is, however, it loses a considerable velocity by the atmospheric resistance, both in ascent and descent.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

LOOM SHUTTLES.—Horace Wells, Hopkington, R.I.—This invention relates to improvements in shuttles, and consists in arranging the spool or bobbin-retaining spring, or other device which holds the bobbin on the spindle, so that when the shuttle is struck by the picker and set in motion in one direction, the spring or holding device will yield to the force of the inertia of the bobbin and set it more gradually in motion, thereby preventing the picking of the thread off the spool or bobbin, now so common, when set in motion in the direction having that tendency. The invention also consists in an arrangement for adjusting the spindle to cause it to stand in line with the long axis of the shuttle when holding the bobbin therein.

CHERRY STONER.—C. A. Fisher, Philadelphia, Pa.—This invention relates to improvements in apparatus for stoning cherries, and consists in the combination of a pair of plates hinged together, and provided with recesses in the two faces which come together, which recesses form molds for holding the cherries, of a follower, provided with a plunger for each mold, and a case for the whole; the said mold plates being provided with small passages through the molds for the passage of the plungers by which the stones are thrust out.

APPLE PARING, CORING, AND QUARTERING MACHINE.—George W. Bennett, Harrodsburg, Ind.—This invention relates to improvements in machines for paring, quartering, and coring apples, and consists in an arrangement on a sliding carriage of the apple-holding and revolving spindle, the knife and the driving mechanism gearing with a toothed rack on the ways upon which the carriage moves for imparting motion to the spindle and the knife for paring, while the apple is carried to coring and quartering cylinders, into which it is forced after it has been pared and the rotary motion of the spindle has stopped. From the quartering and coring cylinders the quarters are delivered laterally into a receptacle, and the cores are forced through the small cylinder and out at the end.

LAMP LIGHTER AND BURGLAR AND FIRE ALARM.—J. B. Irwin, Newark, O.—This invention relates to improvements in apparatus for lighting and extinguishing lamps, and giving alarm for awakening persons at required times, or in case of burglars making attempts to enter buildings, or of fire, and consists in a revolving match-holding and scraping mechanism worked by a spring, let free, either by pulling a cord by a person in bed, or by a weight let fall at the required time by the action of attachments to a clock, or by the moving of doors or windows by the attempts of burglars to enter, or by strings burned off by fire in case of fire. It also consists in the connection therewith of an alarm mechanism to be set in motion by the clock, burglars, or fire.

STEAM GENERATOR.—George O. Sampson, Jamestown, N. Y.—This invention relates to improvements in the sectional boilers made of hollow cast-iron plates, set up on end and clamped together at the sides, by long clamping bolts running through the whole. The invention consists in forming the bonnet or connection between the lower and upper flues at the rear, which conveys the product of combustion from the lower flues to the upper return flues, within the rear plates; also in forming the return flues through the plates in zig-zag lines, so that the heat will impinge upon the surfaces of the flues, and act more intensely thereon.

DOUGH WORKER.—Wm. R. Pool, Havana, Ala.—This invention relates to improvements in machines for rolling or working dough, and consists in the employment in slotted bearings on each side, of a table suited for the ready application and removal of the same, and for working higher or lower, as required in the bearings of a roller, to be turned back and forth by hand or otherwise, and having weighted levers for pressing it down to the work, under which roller the dough is worked back and forth by turning the rollers first one way and then the other.

BRAD PUNCH.—Roswell F. Cook, Potsdam, N. Y.—This invention relates to improvements in automatic feeding brad punches, and consists in an application to the plunger, and to the feeding rack of a feeding and holding pawl arranged to feed and lock the rack by the return movement, in an adjustable arrangement of the gage, and in an improved construction of the plunger case for application of the operating pawl.

COMBINED STAND AND CLOTHES DRYER.—Michael E. Charles, Hope, Ind.—This invention consists in arms, so combined with an ordinary table or stand, that they may either hang pendant from the under side of the table or be made to stand out radially from the table so as to form a clothes dryer.

CLOTHES DRYER.—David Morris, Cutler, Ohio.—This invention consists in a vertical standard, provided with a recessed circular head, and combined with arms pivoted in the recesses of the head, and provided with folding bars, which may be turned down, so that their lower ends rest on the ground when the arms are extended, so as to form supports at the outer extremities of the same.

HAND-SAWING MACHINE.—G. P. Hill and Edward C. Dow, East Deering, N. H.—This invention relates to an improved arrangement of driving mechanism for the arbors of hand-sawing machines, and consists in journaling one end of the arbor between the peripheries of three friction wheels, one of which, preferably the upper one, is arranged in movable bearings, and provided with springs to press it upon the journal of the arbor, and all have a belt working over them. The power is applied by hand crank preferably to one of the wheels in fixed bearings.

STOVE LEG FASTENER.—Frank Moon, Newberry C. H., S. C.—This invention relates to improvements in securing the legs to stoves, and consists in the application to the leg of a spring bolt, and in providing a socket in the under side of the bottom plate of the stove, so arranged that when the leg is shoved "home" in the dovetailed groove, the bolt will be thrown up into the socket and prevent the leg from working out of the groove. A stem of the bolt projects down through the leg to be taken by the fingers to pull it out of the socket when the leg is to be removed.

AUTOMATIC MAGNETIC INDICATOR.—James P. Snyder, Brooklyn, N. Y.—This invention relates to improvements in the magnetic burglar alarm apparatus used in houses, hotels, and the like, to sound alarms when efforts are made to enter by raising windows, or opening doors, and it consists in an arrangement for setting in action automatically a secondary circuit, which will continue the alarm, although the circuit first set in action may be suddenly stopped again by the closing of the window or door, by the burglar overhearing the alarm. The invention also consists in an arrangement for causing the armature to effect the uncovering of the name or number of the room, from which the alarm proceeds.

STOVE GRATE.—Price Dempsey, Erie, Pa.—This invention relates to improvements in stove grates, and has for its object to provide an arrangement of that class of grates which revolve horizontally, whereby the ashes and cinders may be more readily discharged. It is also designed to provide a simple and cheap construction. The invention comprises the combination with a circular rim having radial projections towards the center, but stopping short of it, leaving a large central space, of a vertically oscillating center, mounted on a shaft supported at the circular part, and having a socket in one end for the insertion of a handle for imparting oscillatory motion to the other part of the grate.

MACHINERY FOR CLEANING PIPE.—Henry Davies, Newport, Ky.—This invention relates to improvements in machinery for cleaning the core sand out of the pipe after casting, and it consists in a combination on an inclined frame, of a set of pipe-holding and rotating rollers, and a sliding, boring, or scraping tool, and suitable operating gears and apparatus for revolving the pipe and drawing the boring or scraping tool with it, for scraping off the sand, which is discharged by the revolving of the pipe.

NUT FASTENING.—E. T. Ligon, Demopolis, Ala.—This invention relates to improvements in fastening nuts to bolts to prevent them from unscrewing, and consists in combining a ring, a pin, or a coating of soft solder, with the nut and bolt in any suitable way, when screwed together, for afterwards melting the solder with a hot wrench, or other means, which, being removed, allows the solder to cool again, and permanently unite the parts.

TABLES.—Charles T. Sutton, Brooklyn, N. Y.—This invention relates to improvements in tables for schools, restaurants, reading rooms, and the like, and consists in an arrangement calculated to economize in space, facilitate adjustment to different positions required for different uses, and to provide a simple and cheap construction.

COMBINED HORSE POWER AND SAWING MACHINE.—Asa Trone, Nebraska, Ohio.—This invention relates to new and useful improvements in machines for sawing logs (cross-cut) by horse power, the arrangement being such that the machine may be used for moving other machinery.

CARPET STRETCHER AND TACKER.—James R. Bancroft and R. C. Bache Philadelphia, Pa.—This invention relates to a new instrument for stretching carpets, matting, etc., and for applying the fastening tacks to the same. The invention consists in the combination of a stretching frame with vertical tack holder and hammer.

LOUNGE.—William H. Colley, Leavenworth, Kansas.—The object of this invention is to so improve lounges, that the head rest of the lounge proper will also serve as a head support for the bed. The invention consists in hinging the upper part of the head rest to the folding seat, so that it will swing in or out with the same, and in thereby making the said head rest part of the extension bed.

FURNACE FOR BOILING OR PUDDLING IRON.—James Westerman, Sharon, Pa.—This invention relates to a new and useful improvement in furnaces for boiling or puddling in the manufacture of wrought iron, whereby the bosh is more perfectly protected from injury, and whereby the waste heat is more perfectly utilized than in ordinary boiling furnaces.

SADDLE OR SWEAT CLOTHS.—Richard Allison, New York city.—This invention has for its object to furnish an improved saddle or sweat cloth, simple and economical in construction, and effective in use.

DETACHER.—Thomas J. Harte, New York city.—The object of this invention is to furnish a detaching apparatus for ships' boats, and for other purposes, which shall be cheap, simple, safe, and effective under all circumstances.

BED BOTTOM.—Cyrus S. Stevens, Portland, Me.—The object of this invention is to provide a cheap, durable, and highly elastic bottom for beds.

DROPPER-ATTACHMENT FOR REAPERS.—Martin T. Reynolds, Centerville Ind.—This invention has for its object to furnish an improved dropper-attachment for reapers, which shall be so constructed as to drop the gavel with the butts of the grain even, and which shall evenly separate the gavel from the grain being cut, while the gavel is being dropped.

PAD-PLATE FOR HARNESS.—Conrad Gahr, Newark, N. J.—This invention relates to certain improvements in the construction of metal plates, which are inserted as stiffenings in harness saddles, and as supports for the turret hooks and rings, and for the other appendages of said saddles, and it consists in several details of construction, whereby the necessity of using the ordinary excessive amount of padding is dispensed with.

DIES FOR FORGING CARRIAGE STEPS.—Leander Burns, Port Chester, N. Y.—This invention has for its object to furnish improved dies for forging carriage steps, by means of which the steps may be quickly and thoroughly formed of two pieces, instead of being forged of a single piece in the ordinary manner.

BOB SLED.—John Wampach, Shakopee, Minn.—This invention has for it object to furnish an improved bob sled, which shall be strong, durable, and convenient, each runner being allowed to move independent of the others to adjust itself to the surface of the ground.

SPARK ARRESTER.—Benjamin P. Freeman and Pat Peyton, Macon, Ga.—This invention has for its object to arrest the sparks, cinders, or other ignited matter, which is discharged into the smoke-stack of a locomotive engine, and, at the same time, to allow the exhaust steam and smoke, which accompany the sparks, to pass freely out of the stack.

SAW BUCK.—Leonard D. Howard, St. Johnsbury, Vt.—This invention has for its object to furnish an improved saw buck, which shall be so constructed and arranged that it may be folded together compactly, for convenience of storage and carriage, and so that the saw will not be liable to cut the upper round of the saw buck.

PRINTING MACHINE.—C. C. Maurice, New York city.—This invention relates to a new machine, which can be employed for all kinds of lithographic and autographic printing, and, also, for printing with types. The invention consists, chiefly in the employment of a stationary segmental platen, in conjunction with a cylindrical printing roller, whereby more rapid and satisfactory operation can be produced. The invention consists, also, in the arrangement of a novel mechanism for operating the said roller.

CLAMP FOR SECURING AUGERS TO CRANKS.—Isaac Holliday, South Brooklyn, N. Y.—This invention has for its object to furnish an improved clamp for securing augers to cranks, which shall be so constructed as to hold the auger securely, and, at the same time, shall be so arranged as to allow the augers to be easily and quickly changed when required.

CANS.—John R. Compton and Crowell M. Toms, Rahway, N. J.—This invention has for its object to furnish an improved can for containing kerosene oil, and other liquids, which shall be so constructed as to open the discharge and ventilating orifices automatically, when the can is inclined to pour out the liquid, and to close them, also, automatically, when the can is raised to a vertical position.

DUMPING PLATFORM.—Geo. Burkett, Bluflon, and Samuel Lantz, Ada, Ohio.—This invention relates to improvements in platforms for dumping coal or wood on engines or tenders, or sand, gravel, and the like, on flat cars for loading, and consists in a platform, arranged on an elevated frame by the side of the railroad, and provided with one set of wheels, near the center, arranged to roll forward and back, and another set arranged to roll up and down inclined ways,as the platform is moved forward and back, to cause it to tilt and return to its normal position. It is also provided with a locking bolt and actuating apparatus, and all arranged so that persons on the tram may unlock it, move it forward, dump, and return it again.

WATER WHEEL.—Henry W. Shipley, Portland, Oregon.—This invention relates to constructing a wheel, with internal buckets, in such a manner that the water is directed to the outside of the rim and held as far possible from the axis during the revolution, so as to obtain its greatest power, the buckets being made exceedingly shallow, and their capacity preserved by widening them and increasing the depth of the wheel, there being three rows of buckets, and, in connection with them, a system of internal casing; the object of thus constructing a water wheel being to utilise to the fullest extent the power of water during dry seasons, and to take advantage of small streams, inasmuch as, by the use of the outside casing, every drop of the water can be saved; and a great amount of leakage prevented.

CARPET SWEEPERS.—A. J. Knight, New York city.—This invention relates to improvements in cushions for carpet sweepers, such as are applied to the extension of the sides thereof, to prevent them from bruising the furniture, when sweeping, by striking against the legs and other parts of the said furniture. The invention consists in making cushions of long, broad belts or strips of thick felt, with straps at the ends, and a buckle arranged for attaching them to large or small sweepers.

ORE FURNACES.—C. M. Atkins and Alexander Govan, Pottsville, Penn.—This invention has for its object to furnish an improved air kiln or furnace for roasting sulphury ores, which shall be so constructed as to roast the ores without any blast for forcing the air through the ores, and which will require but a small amount of fuel.

MALTING FLOORS.—Charles Hollmann, Union Hill, N. J.—This invention has for its object to improve the construction of malting floors of artificial stone, so as to prevent the said artificial stone from being cracked and broken by the contraction and expansion of the wooden floor upon which it is laid.

ADJUSTABLE COUPLING FOR JOURNALS, AXLES, ETC.—Frederick Burghardt, Curtisville, Mass.—This invention has for its object to furnish an improved coupling for connecting the parts of car axles, or other revolving axles, journals, or shafts, which shall be simple in construction and effective in operation, effectually holding the adjacent ends of the coupled axle, journal, or shaft, against longitudinal movement, and at the same time allowing the said parts to each revolve freely and independently of the other.

CORN PLANTER.—J. G. Fetzer, Brunswick, Mo.—This invention has for its object to furnish an improved corn planter, which shall be simple in construction and effective in operation, and which shall at the same time be so constructed and arranged as to enable the corn to be planted accurately, without its being necessary to mark out the ground.

MANUFACTURE OF ARTIFICIAL LEATHER.—S. Sorensen, Ebeltoft, Denmark.—The object of this invention is to so treat the scraps and pieces of leather, which are generally thrown away as useless by shoemakers and others, that a fabric resembling leather in strength, flexibility, and appearance, will from such process be produced.

DUMB WAITER.—W. H. Elliott, Boston, Mass.—This invention has for its object to improve the construction of dumb waiters, so that they may be easily and conveniently raised and lowered to or from any story of the building, and fastened and unfastened by any one upon any story, whether above, or below the waiter, and which shall at the same time be simple in construction, and easily operated.

FLATIRON HEATER.—Josiah Burgess, Zanesville, Ohio.—The object of this invention is to provide suitable and efficient means for heating flatirons and consists in a portable apparatus for that purpose, which may be used in any locality, either indoors or out.

OX BOWS.—A. L. D. Moore, Lagrange, Texas.—The object of this invention is to provide an ox bow, which shall not require bending, and which may be made in sections of the country where timber suitable for bending is scarce.

STEAM AND HOT WATER BOILER.—A. L. Pennock, Philadelphia, Pa.—This invention relates to a new steam and hot water boiler of novel construction, arranged with a view of producing a large heating surface, and a proper circulation of water and heated gases.

COMBINATION BATH TUB.—A. C. Brownell, Brooklyn, N. Y.—This invention relates to a new and useful improvement in bathing apparatus, and consists in combining with the ordinary bath tub a vessel or tub arranged for a "sitz bath," either permanently attached or so constructed that it may be removed therefrom.

SEWING MACHINE SETTER.—J. W. Field, Marysville, Ohio.—This invention has for its object to enable the operator of a sewing machine to set a fresh needle in that position in the holder, which will give the desired length of loop without the trouble and delay of adjustment on his part.

MANUFACTURE OF CITRIC ACID.—W. R. Johnston, Memphis, Tenn.—This invention has for its object to facilitate the manufacture of citric acid from the hitherto worthless sour or bitter oranges which abound in the Southern States of the Union. The acid is produced by precipitating it either by means of lime or lead.

PROJECTILE.—Joseph Link, Raleigh, N. C.—This invention has for its object to cause the explosion of a shell by means of a needle communicating with a button at the front end of the shell, and extending thence inward to a cap that lies in contact with the explosive material, so that the striking of the forward end of the shell against any object, after its discharge, may result in its explosion.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

990.—WASHING AND IRONING TABLES.—O. H. Weed, Boston, Mass. March 28, 1870.

1,003.—SASH FASTENER.—Edward Blythe, Rochester, N. Y. April 6, 1870.

1,021.—SPRING FILE OR BINDER.—A. M. Crowhurst, Boston, Mass. April 7, 1870.

1,075.—METHOD OF APPLYING POWER TO THE RUNNING OF MACHINERY.—AND TOOLS.—W. S. Coon. Rochester, N. Y. April 13, 1870.

1,082.—FILTER.—F. C. Krause, New York city. April 13, 1870.

1,084.—MEANS FOR WORKING RAILROAD SWITCHES.—James Davis, New Orleans, La. April 13, 1870.

1,089.—UTILIZING COTTON WASTE.—Anthony Peple, East Billerica, Mass. April 13, 1870.

1,100.—METALLIC ALLOYS OF MANGANESE.—Elliott Savage, West Meriden, Conn., and Jos. Mayer and Julius Waterman, New York city. April 14, 1870.

1,101.—KNITTING MACHINE.—E. K. Harding, Bath, Maine. April 14, 1870.

1,114.—APPARATUS TO BE EMPLOYED IN THE PERFORMANCE OF GYMNASTIC EXERCISES.—Wm. Hanlon, New York city. April 16, 1870.

1,145.—DEVICE FOR OPERATING THE THROTTLE VALVES OR REGULATOR IN LOCOMOTIVE ENGINES, ETC.—H. L. Brevort, Brooklyn, N. Y. April 19 1870.

1,146.—COMBINATION CULINARY ARTICLES.—S. Cooke, New York city April 19, 1870.

1,153.—APPARATUS TO PROMOTE CIRCULATION IN LOCOMOTIVE STEAM BOILERS.—W. B. Mack, Detroit, Mich. April 20, 1870.

1,155.—HARDENING COMPOSITION FOR GUMS AND OILS.—J. B. Newbrough, New York city. April 20, 1870.

1,158.—SHIRT FRONTS AND CUFFS.—E. H. N. Warner, New York city. April 20, 1870.

1,164.—ADJUSTABLE BEDSTEAD.—W. O. Reid, Vienna, N. C. April 21, 1870.

1,152.—CONDENSERS FOR MARINE STEAM ENGINES.—John Houpt, Springtown, Pa. April 20, 1870.

1,154.—BUTT HINGES.—G. A. Lloyd and J. W. Stow, San Francisco, Cal. April 20, 1870.

1,171.—KNITTING MACHINERY.—J. R. Clark and G. M. Patten, both of the State of Maine. April 22, 1870.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING May 24, 1870.

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103,275.—PREPARING THE FIBER OF RAMIE AND OTHER PLANTS.—S. M. Allen, Boston, Mass.

103,276.—SWEAT CLOTH FOR SADDLE.—Richard Allison, New York city.

103,277.—STOPPING MECHANISM FOR DOUBLING, SPOOLING, AND LIKE MACHINES.—James Arnold, Pawtucket, R. I.

103,278.—HANDLE FOR KNIVES.—Jacob B. Bailey, New York city.

103,279.—ROTARY STEAM ENGINE.—John W. Bailey, Aurora, Ind.

103,280.—FILTER.—Thomas Barrows, Brooklyn, N. Y.

103,281.—BIT STOCK.—Harry S. Bartholomew, Bristol, Conn.

103,282.—CLOTHES WRINGER.—E. G. W. Bartlett, Providence, R. I.

103,283.—DEVICE FOR HITCHING HORSES.—W. H. Bell, Spring Lake, Mich.

103,284.—APPLE PARER, CUTTER, AND CORER.—George W. Bennett, Harrodsburg, Ind.

103,285.—STREET CAR TRUCK.—John Berry, San Francisco, Cal.

103,286.—MARINERS' COMPASS.—John Bliss and G. H. Bliss, Brooklyn, N. Y.

103,287.—MARINERS' COMPASS.—John Bliss and G. H. Bliss, Brooklyn, N. Y.

103,288.—KEY HOLE GUARD.—James F. Bodtker, Chicago, Ill.

103,289.—GRAIN PLANTER.—Isaac Bogart, Newport, Ind.

103,290.—PAINT FOR SHIPS' BOTTOMS, ETC.—James Bowker, Baltimore, Md.

103,291.—VARNISH FOR TIN WARE.—Jas. Bowker, Baltimore, Md.

103,292.—HOISTING APPARATUS.—G. W. Brown, New York city.

103,293.—COMBINATION BATH TUB.—Asa C. Brownell, Brooklyn, N. Y.

103,294.—SADIRON HEATER.—Josiah Burgess, Zanesville, Ohio.

103,295.—ADJUSTABLE COUPLING FOR JOURNALS, AXLES, ETC.—Frederick Burghardt, Curtisville, Mass.

103,296.—DIE FOR FORMING CARRIAGE STEPS.—Leander Burns, Port Chester, N. Y.

103,297.—GAS HEATER.—C. C. Burt, Jackson, assignor to G. Herrick, Albion, Mich.

103,298.—BARREL.—E. H. Cady, Grand Rapids, Mich.

103,299.—DRINKING TUBE FOR INVALIDS.—Eugene Chapin, St. Louis, Mo.

103,300.—DRINKING TUBE FOR INVALIDS.—Eugene Chapin, St. Louis, Mo.

103,301.—LOUNGE.—William H. Colley, Leavenworth, Kansas.

103,302.—WEATHER STRIP FOR DOORS.—E. G. Covey and Addison Birch, Marshall, Mich.

103,303.—MACHINE FOR BEVELING AND CROZING BARRELS.—H. A. Crossley, Cleveland, Ohio.

103,304.—ROTARY INJECTOR FOR STEAM BOILERS.—H. C. Crowell, Morgan, Ohio. Antedated May 10, 1870.

103,305.—MACHINE FOR CLEANING CAST PIPES.—Henry Davies, Newport, Ky.

103,306.—COOKING STOVE.—W. C. Davis and John W. Garrison, Cincinnati, Ohio.

103,307.—STOVE GRATE.—Price Dempsey, Erie, Pa.

103,308.—NUT LOCK.—Casper Dittman, Leacock, Pa.

103,309.—MACHINE FOR BURRING WOOL, ETC., ON THE SKIN.—G. F. Dockham, Lynn, Mass.

103,310.—TOWING HOOK FOR CANAL BOATS.—James Doty and Asa H. Doty, West Falls, N. Y.

103,311.—LOOP FOR HARNESS.—G. L. Du Laney and James S. Huston, Mechanicsburg, Pa.

103,312.—TOOL AND WHEEL FOR CUTTING AND POLISHING IRON, STEEL, AND OTHER MATERIALS.—A. K. Eaton, Piermont, N. Y. Antedated May 9, 1870.

103,313.—DUMB WAITER.—William H. Elliott, Boston, Mass.

103,314.—LATCH.—M. Proctor Favor, East Northwood, N. H.

103,315.—CORN PLANTER.—J. G. Fetzer (assignor to himself and A. H. Fetzer), Brunswick, Mo.

103,316.—SHUTTER FASTENER.—John Bentley Field, Detroit, Mich.

103,317.—CHERRY STONER.—Charles A. Fisher, Philadelphia, Pa.

103,318.—GATHERING ATTACHMENT FOR SEWING MACHINES.—H. A. Fisher, Elyria, Ohio.

103,319.—MACHINE FOR ATTACHING THIN PAPER TO STRAW BOARDS.—Maurice Fitzgibbons, Brooklyn, N. Y.

103,320.—APPARATUS FOR RECTIFYING ALCOHOLIC LIQUORS.—C. L. Fleischmann, Cincinnati, Ohio.

103,321.—PAD PLATE FOR HARNESS.—Conrad Gahr, Newark, N. J.

103,322.—Suspended.

103,323.—MANUFACTURE OF SHEET IRON.—John D. Grey (assignor to himself and John Lippincott) Pittsburgh, Pa. Antedated May 7, 1870.

103,324.—STEAM BOILER FURNACE.—C. J. Hagstreem, Chicago, Ill.

103,325.—ANTI-FREEZING DEVICE FOR PUMPS.—John G. Hanning (assignor to himself and Roswell R. Rouse), Indianapolis, Ind.

103,326.—CONDENSER FOR STILLS.—John Harrison and Caleb Low, Fawn Grove, Pa. Antedated May 10, 1870.

103,327.—PRUNING SHEARS.—Aaron L. Hatfield, Clyde, Ohio.

103,328.—WOOD PAVEMENT.—Herman Haupt, Philadelphia, Pa.

103,929.—CONFLUENT COCK.—John H. G. Hawes, Newark, N. J.

103,330.—BOX OPENER.—Albert Heusser, Ellington, Conn.

103,331.—GALVANIC BATTERY.—Joseph Hill (assignor to himself, M. S. Frost, and E. P. Hayler), New York city.

103,332.—KNITTING MACHINE.—Warren S. Hill, Manchester, N. Y.

103,333.—LAYING MALTING FLOOR.—Chas. Hollmann, Union Hill, N. J.

103,334.—FEED TRAP FOR LAMPS.—M. W. House, Cleveland, Ohio.

103,335.—SAW BUCK.—Leonard D. Howard, St. Johnsbury, Vt.

103,336.—REFRIGERATOR.—Francis W. Hunt, Brooklyn, N. Y.

103,337.—FLY NET FOR HORSES.—Jas. S. Huston, Mechanicsburg, Pa.

103,338.—LAMP LIGHTER, AND BURGLAR AND FIRE ALARM—James B. Irwin, Newark, Ohio.

103,339.—WASHING MACHINE.—Joseph Johnson, Boston (Highlands), Mass.

103,340.—MANUFACTURE OF CITRIC ACID.—Wm. R. Johnson, Memphis, Tenn.

103,341.—MITER MACHINE.—F. C. Jones, Ouachita parish, La.

103,342.—TUCK MARKER FOR SEWING MACHINE.—James F. Kellogg, North Bridgewater, Mass.

103,343.—PISTON PACKING.—Orlando Kelsey, Worcester Mass.

103,344.—GUARD FOR CARPET SWEEPER.—A. J. Knight, New York city.

103,345.—PIANO.—Christian Kurtzmann, Buffalo, N. Y.

103,346.—PARLOR SKATE.—John Lemman, Cincinnati, Ohio.

103,347.—SAW TABLE.—Mitchel Lepp, Albany, N. Y. Antedated May 17, 1870.

103,348.—LOCK NUT.—E. T. Ligon, Demopolis, Ala.

103,349.—SEWING MACHINE.—Benjamin Little and John R. Lundberg, Coffee Creek, Ind.

103,350.—TUBULAR SUBMARINE VIADUCTS.—W. G. Mann, Savannah, Ga.

103,351.—PRINTING PRESS.—Charles Camille Maurice, New York city.

103,352.—POCKET CUTLERY.—Wm. H. Miller and George W. Miller, Meriden, Conn.

103,353.—CURTAIN FIXTURE.—Jas. Montgomery, Marseilles, Ill.

103,354.—STOVE LEG FASTENER.—Frank Moon, Newberry Court House, S. C.

103,355.—OX BOW.—Alfred L. D. Moore, Lagrange, Texas.

103,356.—COTTON, HAY, AND HEMP PRESS.—Wm. H. Morris, Troy, Tenn.

103,357.—WASHING MACHINE.—Russell S. Morse, Wilton, Me.

103,358.—FOLDING CHAIR.—William Morstatt, New York city.

103,359.—SAW SET.—James Morton, Philadelphia, Pa.

103,360.—MEAT CUTTER.—August Nittinger, Philadelphia, Pa.

103,361.—CUTTER BAR FOR HARVESTER.—Wm. Jas. Oxer, Williamsport, Ind.

103,362.—COMBINED CORN HARVESTER AND HUSKER.—Samuel Patton, Chatsworth, Ill., assignor to himself, John M. Long, and Robert Allstatter, Hamilton, Ohio.

103,363.—STEAM GENERATOR.—Abraham L. Pennock, Philadelphia, Pa.

103,364.—CHURN.—W. H. Pennock, Mermaid, assignor to himself and W. H. Greenwalt, Mill Creek Hundred, Del. Antedated April 28, 1870.

103,365.—BOOT-BLACKING ATTACHMENT TO BUREAUS.—Wm. E. Phelps, Elmwood, Ill.

103,366.—DOUGH WORKER.—William R. Pool, Havana, Ala.

103,367.—ELEVATOR AND CONVEYER.—T. J. Powell, Naples, N. Y.

103,368.—SAFETY SOCKET FOR WHIP.—Winthrop D. Putnam, Chicago, Ill.

103,369.—FLEXIBLE TUBING OR HOSE.—Thomas L. Reed, Providence, R. I.

103,370.—DROPPING PLATFORM FOR HARVESTERS.—Martin T. Reynolds, Centerville, Ind.

103,371.—MACHINE FOR WASHING BARRELS.—Thomas Reynolds, Yonkers, N. Y.

103,372.—HAULING UP LOGS.—S. H. Richardson (assignor to himself and T. N. Egery), Bangor, Me.

103,373.—DREDGING MACHINE.—Wm. D. Robertson, San Francisco, Cal.

103,374.—DEVICE FOR NEBULIZING PERFUMES AND VOLATILE LIQUIDS.—Edward P. Rouche, Bath, Me. Antedated May 17, 1870.

103,375.—BALANCE ELEVATOR.—C. B. Sawyer, Fitchburg, assignor for one half his right, to J. W. Labaree, Springfield, Mass.

103,376.—NAIL MACHINE.—Henry Scheuerle, New York city. Antedated May 13, 1870.

103,377.—AMALGAMATOR AND ORE CONCENTRATOR.—Joseph Scott, San Francisco, Cal.

103,378.—GRATING, SIFTING, AND SLICING MACHINE.—John F. Shepard, Hampton Falls, N. H.

103,379.—WATER METER.—Gerard Sickels, Boston, Mass.

103,380.—ROLLED IRON OR STEEL COLUMNS.—F. H. Smith, Baltimore, Md.

103,381.—BRICK PRESS.—J. N. Smith, Jersey City, N. J.

103,382.—SEED PLANTER.—Thomas H. Smith, Clyde, N. Y.

103,383.—ELECTRO-MAGNETIC INDICATOR FOR BURGLAR ALARM AND FOR OTHER PURPOSES.—James P. Snyder, Brooklyn, N. Y.

103,384.—SIZING COTTON AND OTHER FABRICS.—Jacob W. Speyer, Hamburg, Germany.

103,385.—APPARATUS FOR DISTILLING HYDROCARBON.—H. A. Stearns, Smithfield, R. I.

103,386.—TINSMITHS' SHEARS.—Orson W. Stow, Plantsville, Conn.

103,387.—TABLE.—Charles T. Sutton, Brooklyn, N. Y.

103,388.—MANUFACTURE OF TUBULAR CANDLES.—F. A. Taber, Boston, Mass.

103,389.—COOKING STOVE.—Christian Temme, St. Louis, Mo.

103,390.—HOT AIR FURNACE.—Moses A. Thayer, Chicago, Ill.

103,391.—APPARATUS FOR OPENING AND CLOSING THE TOP OF BLAST FURNACES.—James Thomas, Parryville, Pa.

103,392.—GAS CONDENSER.—Edward Thompson, Madison, Wis. Antedated May 14, 1870.

103,393.—PAPER HANGERS' APPARATUS.—Wm. F. Trautman, Llewellyn, Pa.

103,394.—HORSE POWER SAWING MACHINE.—Asa Trone, Nebraska, Ohio.

103,395.—ATTACHMENT FOR BUCKLES.—H. Trott, Boston, Mass.

103,396.—BOB SLED.—John Wampach, Shakopee, Minn.

103,397.—MACHINE FOR ROLLING METALS.—Wm. H. Ward, Auburn, N. Y. Antedated May 14, 1870.

103,398.—GEAR WHEEL.—William H. Ward, Auburn, N. Y.

103,399.—HOUSING FOR METAL-ROLLING MILLS.—Wm. H. Ward, Auburn, N. Y.

103,400.—SHUTTLE FOR LOOMS.—Horace Wells, Hopkington, R. I.

103,401.—FURNACE FOR BOILING AND PUDDLING IRON.—Jas. Westerman, Sharon, Pa.

103,402.—COMPOUND FOR OILING, POLISHING, AND BLACKING LEATHER.—Geo. F. Whitney (assignor to himself and Herbert S. Merrill), Boston, Mass.

103,403.—ROOFING COMPOUND.—Luke A. Wilder, Chicago, Ill.

103,404.—APPARATUS FOR MEASURING LIQUIDS.—Moses H. Wiley and Thos. Miller (assignors to themselves and John H. B. Lang) Boston, Mass.

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103,421.—Hammer Strap for Wagons.—Charles Brown (assignor to himself and A. G. Salom), Adrian, Mich. Antedated May 13, 1870.
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103,533.—Cutter for Cutting the Bodies of Fruit Baskets.—B. D. Whitney, Winchendon, Mass.
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REISSUES.

3,987.—Machine for Cutting Leather.—Charles F. Davis, Thomas Corey, Samuel Boyd, and Roger Boyd, Marlborough, Mass., assignees of C. S. Stearns.—Patent No. 58,815, dated Sept. 25, 1867.
3,988.—Tree for Sidesaddles.—J. B. Gathright, Louisville, Ky.—Patent No. 74,909, dated Feb. 25, 1868.
3,989.—Coating Iron and Steel.—S. B. Hewitt, Jr., Eagle Grove, and L. P. Jones, Iowa Falls, Iowa, assignees of Charles Usher.—Patent No. 62,706, dated March 5, 1867.
3,990.—Reversible Knob Latch.—Russell & Erwin Manufacturing Co., New Britain, Conn., assignees of C. R. Fisher.—Patent No. 80,539, dated August 4, 1868.
3,991.—Carriage Axle.—Alfred E. Smith, Bronxville, N. Y.—Patent No. 98,436, dated Dec. 28, 1869.
3,992.—Machine for Separating Grain and Other Materials.—William W. Stoll, Brooklyn, N. Y., assignee, by mesne assignments, of Charles G. Stoll and William Stoll.—Patent No. 54,263, dated April 24, 1866.
3,993.—Can for Paint, Fruit, etc.—The Devoe Manufacturing Co., New York city, assignees of Herman Miller.—Patent No. 43,326, dated June 28, 1864.
3,994.—Sewing Machine.—The Globe Sewing Machine Co., Buffalo, N. Y., assignees of Nicholas Meyers.—Patent No. 99,783, dated Feb. 15, 1870.
3,995.—Division A.—Machine for Making Kettles.—The Waterbury Brass Co., Waterbury, Conn., assignees of H. W. Hayden.—Patent No. 8,589, dated Dec. 16, 1851; extended seven years; reissue No. 2,171, dated Feb. 13, 1866.
3,996.—Division B.—Brass Kettle.—The Waterbury Brass Company, Waterbury, Conn., assignees of Hiram W. Hayden.—Patent No. 8,589, dated Dec. 16, 1851: extended seven years; reissue No. 2,171, dated Feb. 13, 1866.
3,997.—Fire Extinguisher for Use on Railroads, etc.—W. P. Van Deursen and W. C. Davis, Cincinnati, Ohio, assignees of H. C. Stewart and R. T. Bradley.—Patent No. 101,404, dated March 29, 1870; antedated March 5, 1870.

DESIGNS.

4,055.—Dog Muzzle.—John Braentigam and Henry Braentigam, Chicago, Ill.
4,056.—Oxygen Generator.—A. H. Carpenter, Newark, N. J.
4,057.—Step and Hitching Post.—Morgan Dyer, Elmira, N. Y.
4,058.—Toy Block.—J. A. H. Ellis, Springfield, Vt.
4,059.—Emery Wheel.—T. J. Frazier, Clinton, Iowa.
4,060.—Ax.—Edward Hurd, Champaign county, Ohio.
4,061.—Type.—Hermann Ilenburg (assignor to Mackellar, Smiths & Jordan), Philadelphia Pa.
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4,063.—Screen for Fireplace.—J. R. Rose and Edward Calely, Philadelphia, Pa., assignors to Samuel Budd Sexton, Baltimore, Md.
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4,067.—Gate Latch.—J. W. Still, San Francisco, Cal.
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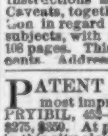

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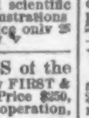

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